RAILROAD GAZETTE

FRIDAY, DECEMBER 18, 1903.

CONTENTS

Contributions

German Designs for High Speed Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* of Aug. 21, 1903, are illustrated a number of freak German locomotives, designed to make a speed of 75 miles per hour and carry 100 passengers. The valves of these engines present quite a variety of design, though the piston valve seems to predominate. The design No. 4 is described as having valves of the "Corliss" type, and the description says that the exhaust valves are driven direct from the cross head, giving the same exhaust and compression for all cut-offs. The point that is not exactly clear in this connection is, how is the reversing of the exhaust valves accomplished if they are driven direct from the cross head? It certainly looks reasonable that the position of the exhaust valves must be changed with the change of position of the admission valves to enable the engine to start backing after having stopped in the forward position, as any steam admitted to one end of the cylinder after reversing admission valves will find an open door to the atmosphere. In an article of mine published in the *Railroad Gazette* some time ago, I advocated the use of separate exhaust valves, but my idea was to drive them from the regular admission gear, thus making them reversible with the admission valves, saving undue complication in the way of extra reverse levers, reach rods, etc. To run separate exhaust valves was no problem, but to preserve the full exhaust opening, constant compression, and at the same time make them reversible, is quite another thing. But it can be successfully accomplished, and, as stated in my article, I see no reason why it would not be an advantage to the engine to so arrange them, especially at high speeds.

As stated in the article of August 21, two of the designs submitted have inside coupling rods, and I agree with Mr. Fry that it is an unnecessary complication. The idea of putting the cab for the engineman at the front end of the engine is a good one, and one that should find favor everywhere, as a better view is obtained and he can be better protected from the weather, cinders, dust, etc. This position of the cab is advocated by a member of the B. of L. E. in the B. of L. E. journal for December, 1903, and is worthy of consideration, as a man running an engine at high speed needs all the chance possible to see what is coming his way. The objection might be raised that this arrangement would separate the engineman and fireman, and if either should drop dead, or get lost overboard he would not be missed for some time. Design 1 provides for this contingency by arranging the engine to be run fire-box end first, thus keeping both men very near together.

The world at large should be given an opportunity to see them on exhibition at the St. Louis Exposition next year, and beside them should be exhibited American locomotives capable of meeting the requirements. A report of the performance of these *freaks* in service would be very interesting to the railroad men of this country. Such a radical departure from standard practice would seem entirely unnecessary. J. V. N. CHENEY.

[As noted in another column, high-speed tests with the steam locomotives are now being made on the Berlin-Zossen line. The preliminary results of these tests will probably be known shortly.—EDITOR.]

Machine Tools and High-Speed Steel.*

Since the discovery of self-hardening tool steel, which contains some carbon, and the high-speed steel, which contains no carbon, and requires to be run at a high temperature for best results, and will do an amount of work impossible with carbon tempering steel, the machine shop superintendent has undertaken to tone up his shop and increase the output by speeding the machinery and taking heavier cuts; but he has met with serious obstacles in the machines from the fact that they will not stand the strain necessary to get maximum results from high-speed steel, and either the machine stalls or some part gives way. It is a fact that no machine shop is to-day fully equipped with machine tools which can use high-speed steel to the limit of its endurance, nor are machine-tool makers prepared to-day to furnish all classes of tools capable of obtaining maximum service from high speed steel.

In getting bids on lathes and planers, it was specified that the lathes should cut ½ in. with ⅛ in. feed 30 ft. per minute, and the planers cut ⅝ in. with ½ in. feed 30 ft. per minute in mild steel. One maker said there were no such tools made, but that they could be made at an increased cost of 50 per cent. of the market price of standard machines. And to-day machine-tool makers are only commencing to build tools of the necessary weight and strength to get the full capacity of high-speed steel.

The question arises, What shall be done with a lot of serviceable machines which are not exactly out of date, but which cannot keep up with the high-speed steel pace? In a great many cases they can be speeded up, and with moderate cuts the output of the tool largely increased, but it is found that the belting commences to give out and cast-iron gears break. It is possible to replace cast-iron gears with steel, but it is very probable that some other part will be unable to stand the strain and the machine will be wrecked.

The effect on belting with increased speed and cut on old tools is most disastrous, and if a tool is worked to its capacity the cost of repairs to belts and the expense for new ones will increase as much as 100 per cent. The belts, if single-ply, can be replaced with light double-ply at a slightly increased cost and an increased service greater in proportion. In some cases it may be found economical to equip the machine with new cones, taking a wider belt.

The possible time saving of high-speed steel, used with old and weak machines, is due to the fact that it will do much heavier work without regrinding and will finish most jobs without having to stop the machine and grind the tools. This item is a most valuable one and will do nearly as much to help a good output as the increased speed and cut. A certain driving-wheel lathe was speeded up so high that the tool steel used at the time would not stand the strain put upon it, and nearly as much time was spent dressing and sharpening tools as was used in turning tires. With high-speed steel this lathe is in continuous service, but cannot pull as much as the steel is capable of cutting.

Is it profitable to continue, for general service, the use of tools not capable of maximum output as calculated to-day? And is it profitable to reconstruct such tools to give greater speed where the design does not allow of much increased strength?

In reply to the first: Where the output of a tool is in such demand that it is worked to its limit of capacity, and to increase the output of the shop would mean the purchase of a similar tool, it will pay to get rid of the original tool and buy a machine of up-to-date design, capable of maximum effort as counted to-day. The single tool of modern design will more than make up its cost in the extra work done. Where a tool is not kept busy all the time it may not be advisable to spend money where increased capacity would mean increased idleness; but even then there would be an argument of cheaper work on account of the faster output.

In reply to the second question: Increased speed can be obtained in most cases by increasing the speed of the countershaft, but great care must be taken not to tax the old tool beyond its endurance, or a series of annoying and sometimes expensive breakdowns will result.

It is impossible to give any rule for scrapping or rebuilding old tools, because the conditions of each shop are so different, and a tool that is very nearly worthless in one shop may be a valuable adjunct to some other shop; but as a general proposition it is advisable to purchase a new tool if it can be shown that 20 per cent. of its cost can be saved per year over and above the output of the old tool. The education of the old-time slow-speed tempered-tool machinist is no small item. This can only be done by intimate personal supervision, and it takes time to get him out of the $^1/_{32}$-in.-feed and $^1/_{10}$-in.-cut rut.

Up to the present time high-speed steels have not given much success in fine work where a heavy cut cannot be taken, nor do they make good finishing tools, the reason being that the high temperature of the point of the tool necessary for good work cannot be maintained on fine cuts, and also when maximum work is being done by the tool the cutting edge is somewhat blunted and does not make a smooth job.

Among the economies brought out by the advent of high-speed steel are the following: Forgings do not have to be finished so closely to make them work up economically, resulting in cheapened cost of blacksmith work; harder cast iron can be used, resulting in greater wearing qualities; tires can be turned with a minimum loss on account of being able to cut closer under the skin.

*Extracts from a paper presented to the December meeting of the Western Railway Club by Mr. J. A. Carney, Master Mechanic of the C., B. & Q.

The Third-Rail and the Trolley.

The following letter was written by Mr. George Westinghouse to the New York *Evening Post*:

I think the following points will be generally admitted:

(1.) That the operation of the elevated trains by electricity has been an undoubted success, and an enormous advantage to the traveling public, notwithstanding the fact that the continuous third-rail has been employed to supply the current.

(2.) That the deaths and injuries to passengers and employees, considering the number of people involved, compare most favorably with any other railroad operation in the world.

(3.) That if a third-rail charged with an immense power of electricity and located upon the surface near the other rails is to be used for the supply of electricity to the trains, then there will always be a source of danger to those who have occasion to come near such third rail, and in addition there will always be a great source of danger due to the fact that a car may be derailed, or that some iron material may become detached and make a short-circuit between such third-rail and the train.

(4.) That this third-rail danger may be lessened by the subdivision of the third rail into sections with provision for the automatic supply of the required amount of current to each section only as required, but that such arrangement will only minimize the third-rail danger.

(5.) That such third-rail danger may be entirely obviated by resorting to the use of overhead conductors, for which the elevated structure is peculiarly suited.

(6.) That there never was a good reason why the overhead wire should not have been used.

In support of these last two propositions it may be stated that the third-rail is impossible for use on main railroads at important junctions and terminals; that the Pennsylvania Railroad does not propose to use the third-rail in its underground work between New Jersey and Long Island; that the overhead wire was used at the Zossen experiments in Germany, when a speed of 120 miles per hour was obtained; and finally, that the New York Railroad Commissioners have recently declared that they would not permit the use of a third-rail on interurban lines crossed many times by highways.

It may seem to be heresy to advocate the use of the overhead wire, but I venture to predict that there will be a complete revulsion of feeling on this point. When I speak of an overhead wire, I do not mean the slight construction which has prevailed, and the breaking down of which has occasioned trouble, but a substantial engineering arrangement so erected that it would, in fact, not be an offence to the eye. It is obvious that the use of an overhead trolley, with the removal of the third rail, would make impossible the present risks of short-circuits between the car or parts of the car and the third rail; but it would leave other questions yet to be settled; namely, first, the proper application of the electric apparatus to those cars, so that in no event could the passengers be frightened by a short-circuit visible to them, and this means that all of the wiring and electrical apparatus would have to be located beneath the bottom of a fireproof car and with no wires carrying large currents above the floors or near the ends of the cars which might be damaged by accident.

I am satisfied, from my conferences with railroad officials, that they are moving in the right direction and giving this subject the attention it deserves; but it must be borne in mind that it has required experience to demonstrate what is necessary for safety.

High Speed in Germany.

(Translated from the *Frankfurter Zeitung*, Nov. 24.)

The high speed tests which have been carried out with electric cars on the Berlin-Zossen Military Railway on a large scale were closed yesterday morning for this year. The two cars had prows modeled after the lines of a ship in order to permit of measurements of the air resistance with variously formed end surfaces, and both made the run of 14¼ miles several times with maximum speeds of between 118 and 130 miles an hour. A large crowd had gathered at the intermediate station of Dahlwitz to watch the cars go past. Fresh proof was given that the track, which is laid with rails weighing only 83 lbs. per yard, had ample strength for the highest speeds, and being very carefully looked after has remained in perfect condition. This fully confirms the predictions of Dr. Zimmerman, who, as a result of his calculations, announced that for these extreme high speeds it was unnecessary to use rails of very great weight, as it is possible to obtain the requisite stiffness and carrying capacity with lighter rails. It is only necessary to increase somewhat the height of the rail at the joints.

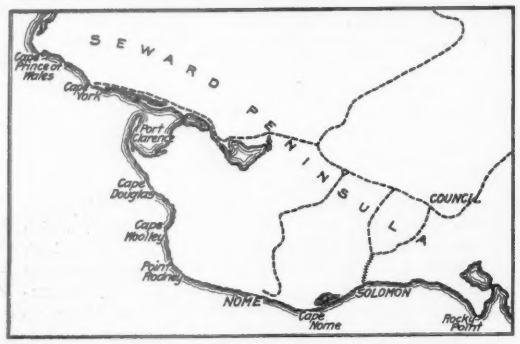
The results of the trials have shown that the rail

manufacturers and many engineers who demanded a heavier rail for the high speeds were in the wrong. The great importance of Dr. Zimmerman's work is that it overcomes the objection to an increase of the present usual speeds on the ground of the great cost of a complete rebuilding of the permanent way. It is, of course, not denied that the cost of maintenance would be somewhat increased.

A further value of the tests is that they have proved incorrect the theory that owing to the air pressure on the sides of the cars it would be necessary to widen the gage of the roads. These results with the many others will be of value to all civilized countries, and we may be proud that they are a product of German science and pertinacity.

Next week the only work will be some special tests to determine the moments of inertia of the heavy electric motors, and then the winter will be devoted to the working out of the extensive material which has been accumulated and which will doubtless appear in an epoch making report.

It is gratifying to see that Herr Budde, the Minister of Railways, does not hesitate to apply the results of the high speed tests directly to the working of the present railroads. In about two weeks time high speed experiments are to be be begun on the Zossen military railroad with steam locomotives, runs of two hours being made each day. The measuring instruments for these trials are nearly completed.



C. C. & S. R.—Line Built and Projected.

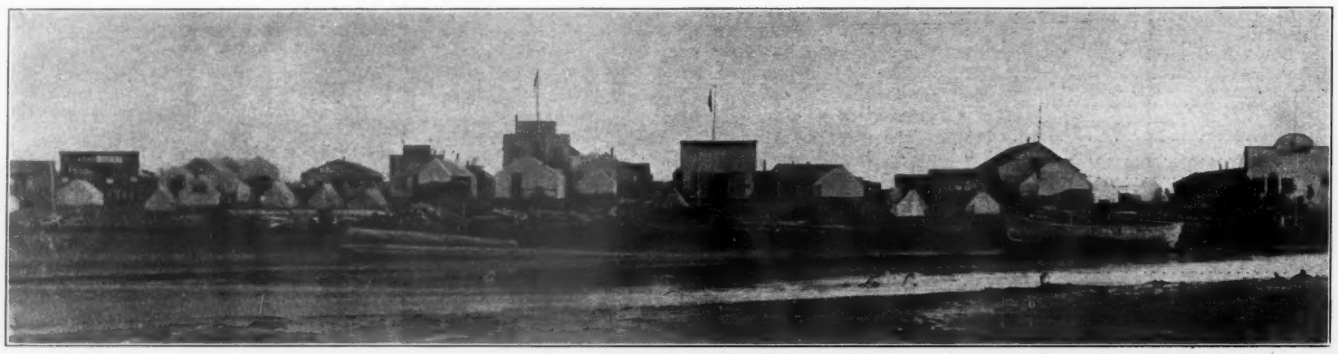
tiate with those works which have heretofore supplied rolling stock to the State for 445 locomotives, 880 passenger cars, 206 baggage cars, 930 special freight cars, and 5,200 freight cars, all to be delivered between April 1 and Nov. 1, 1904. Of the locomotives, 167 are to be compounds, all for passenger or express service. Fifty are to have seamless boilers of the Ehrhardt pattern. Two hundred and forty-seven of the passenger cars and 100 of the baggage cars are to be eight-wheeled; all the other passenger cars are to be six-wheeled. Among the freight cars 300 flat cars will be eight-wheeled.

Two New Railroads in Alaska.

The first of the two railroads described, the Council City & Solomon River line, is designed to afford a practicable means of transit between Nome, Council City, and other points in the Solomon River country, where freight rates between Nome and Council City, via horse or dog team, formerly averaged about $55 a ton for the distance of barely 20 miles. The other, the Alaska Central, intends to build from Resurrection Bay nearly due north to the Arctic Circle, crossing the Yukon, but the first 410 miles of the line, terminating at Atwood, are all that are definitely contemplated at present. The Alaska Central began building operations last September, and hopes to reach Lake Kenai, shown on the map in the lower part of the territory, by next June; the Council City & Solomon River has about 10 miles of line now open.

Council City & Solomon River.

Beginning at the town of Solomon, the railroad follows up Solomon river, the mouth of which is about 36 miles east of Nome. Big Hurrah creek, 10 miles from Solomon, is the first regular station, though freight and passengers are landed at intermediate points as required. Thence the road continues up the Solomon river valley, to the Right Branch, the next station; thence up the right branch and over its divide. After crossing Skookum creek, the road is to follow the general course of the waterways to Council, and there find its present terminus.



Town of Solomon, from the Flats.

The Town of Solomon.

The first section of the road, already built, is shown by a cross-hatched line on the accompanying sketch map of the Seward peninsula region, and the light lines indicate proposed extensions, work on which is expected to be continuous during the building season, for the next few years. A small railroad known as the Wild Goose line, connecting Nome with Anvil Creek, as described in Mr. Atkinson's article on Arctic railroading, printed in the *Railroad Gazette* Nov. 13, was the only aid to transportation in the peninsula before the first section of the Council City & Solomon River was opened.

Construction work on the latter was begun at Solomon on the 19th of last June. A bridge was built across the lagoon there, and a spur track laid from the beach, where material and supplies, brought from Seattle and other points south, were landed from the steamers. Although much of the material was purchased at places from 5,000 to 6,000 miles from the port of Solomon, tools, lumber, etc., were warehoused at the docks at Seattle before the opening of navigation, last spring, and the first steamers to leave Puget Sound for Bering Sea, some under special charters, began the task of carrying all of a railroad except the grade to a section of country where for miles there is not a stick of timber growing.

Work was started with a total force of nearly 600 men, for whom food and shelter had, of course, to be provided by the company. A mess tent capable of holding 400 men was put up, and on one occasion 387 were served at the same time. The food was purchased at Nome. Work is now suspended for the winter, and cannot be continued much before next June, but it is hoped that Council City will be reached during 1904. The last supplies this year were landed October 7, and made a total for the season of 24,000 tons, which included more than seven million feet of lumber. There is a timber belt 32 miles from the coast, however, and it is expected

As we have now come to look on speeds of 90 miles an hour and more from a point of view quite different to that previously held, it is to be assumed that these tests will lead to practical results in steam railroading and will enable the traveling public to save both time and money. The tests of the superheated steam locomotive and of the new car trucks should lead to important technical conclusions.

Interest in these matters will be stimulated by the fact that further tests with electric motive power for average speeds of over 60 miles an hour are to be carried forward on some of the other government railroads.

The reporter made in all seven trips, with a maximum speed of 130.5 miles an hour, and is fully convinced that, in consequence of the high speeds which have been attained, important changes will be made in railroad practice which will open to the government as well as to the people questions of development which are of the highest order of importance.

The Berlin Directory of the Prussian State Railroads, which has charge of making contracts for rolling stock for the whole State system, has been authorized to nego-

Construction Camp, Council City & Solomon River Railroad.

that it will be reached some time next August, enabling a great saving to be made in timber shipments.

The country is fairly level, and the maximum grade of the line as laid out is $^{9}/_{10}$ of 1 per cent. Much of the country traversed is a species of frozen bog known as tundra, but J. W. Dickson, the Chief Engineer, believes that nothing but drainage is required to transform it into perfectly good roadbed material. The tracks are laid on the ground, which is frozen and remains so for a depth of about 2 ft. below the grass roots, and ballasted with gravel hauled from the beach and with shale from the foot hills.

The supplies now at hand include two of the little Forney locomotives formerly in use on the Manhattan Elevated, in New York, and enough freight cars to handle the present business and construction work. A gondola car covered with a tarpaulin, constituting the standard day coach at present in use, is shown in one of the accompanying photographs, but additional equipment, including locomotives and coaches, will be delivered in the spring. Work done this year also includes the erection of several permanent buildings at the Dickson terminal, across the river from Solomon, including an office and residence building and a machine shop.

The first 10 miles of the road were opened on September 2, and the accompanying photographs show the substantial character of the work which has been done. The

Method of Drainage.

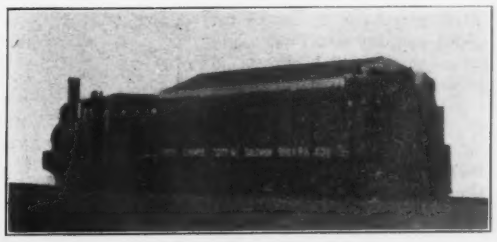
Dwelling and Machine Shop at the Dickson Terminal.

line is 4 ft. 8½ in. gage, and the roadbed has not been disturbed by frost, owing to the continuous cold prevailing.

Alaska Central.

Construction work on this road was begun in September and will be continued through the winter as steadily as conditions will permit. This does not necessarily mean as intermittent progress as might be expected according to the popular idea of Alaskan winters. The first 250 miles of the line will traverse an agricultural country having climatic conditions quite similar to those of Michigan and Wisconsin. The lowest temperature for eight years past recorded by a Government agricultural station on Lake Arm was 2 deg. below zero. Further north, in the Susitna region, the winter temperature gets to 25 or 30 deg. below zero, being much the same as around St. Paul and Duluth. It will therefore be quite as practicable to carry on construction work during the winter months as in the northern part of the United States.

The accompanying map shows the line and the region it will traverse. Seward, the southern terminus, is on Resurrection Bay, which is about four miles long, two miles wide and is land-locked, making an excellent harbor in which the water is very deep, even close to the shore. Fifteen miles north of Seward the line goes through Moose Pass in the Coast Range Mountains at an elevation of 704 ft. The average height of the mountains in this section is between 5,000 and 6,000 ft. Lake Kenai is passed 15 miles further on, or 30 miles from Seward, at an elevation of 450 ft. The elevation increases again until Trail Creek, 40 miles inland, is reached at 950 ft., from which point there is a gradual descent for 50 miles until tidewater elevation is reached once more. For the next 50 miles, which brings the line to the crossing of the Matanuska River, the country is



Standard Day Coach.

practically level. The Susitna River is reached 140 miles from Seward, at an elevation of 200 ft. This river is followed for some distance; the line runs northeast after crossing it, and then swings sharply north until it comes close to the Chulitna River, which it follows through Broad Pass, 38 miles east of Mt. McKinley. The elevation through the pass is 2,200 ft. Emerging from Broad Pass, the line swings east to the Cantwell River, which it follows till it reaches the Tanana River at Atwood, the northern terminus, having an elevation of 780 ft.

Partially Completed Embankment.

Trestle over Rock Creek—Construction Train and Forney Locomotive.

The length of the line to Atwood will be 410 miles. The map shows a number of proposed branches, but there is no probability of any of these being built for a long time to come, with the exception of the one to Copper Center, 115 miles. Large copper deposits have been found there of sufficient richness to justify the construction of this branch.

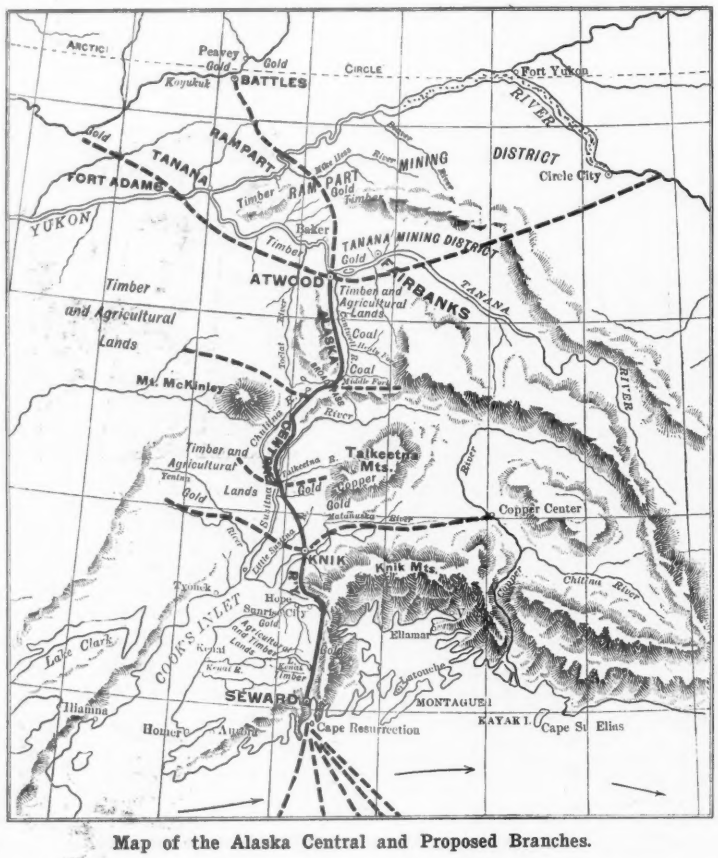
The country tributary to the line of the road is extremely rich in mineral deposits, in which gold appears to predominate. The gold fields in the vicinity of Atwood are said to be the richest in Alaska. A new field has just been discovered on the headwaters of the Susitna which, accounts say, will, from surface indications prove one of the richest finds in the territory. The Talkeetna Mountains are rich in copper, and around Lake Kenai there is gold in paying amounts. There is much fine grazing and agricultural country along the line, and the hillsides are covered with spruce and fir. There are also large deposits of bituminous coal.

The construction of the line does not present any unusual difficulties. The maximum grades are 2 per cent.

and there is but one long bridge, which will cross the Matanuska River. It will be a 600-ft. structure in two spans and will be built of steel. There will be three other steel bridges, from 150 to 200 ft. long, spanning the smaller rivers. A large wharf has already been built at Seward, and the company has its own saw-mills for supplying timber to the construction outfits. It will build its own bridges. The grading and track work is being done by contract.

Seward was opened up in July by the railroad company, and $65,000 worth of town lots were sold the first week without any special advertising being done. The town now has a population of between 500 and 600. The site of the town, which is fairly level, was covered by a heavy spruce forest.

There are, at present, two ways of reaching the Tanana mining country from Seattle. One is by way of Skagway, over the White Pass & Yukon Railroad and thence along the different rivers, which afford a continuous waterway to the Yukon River, down the latter to the Tanana River and up the Tanana to the mining district. This trip takes 28 days and costs $280. The other route is by sea to St. Michael and up the Yukon and Tanana rivers. This takes 30 days and costs $300. From the first of November to the first of May neither route can be traveled. By the Alaska Central the trip will require six days, cost $140, and may be taken at any time of the year.



Map of the Alaska Central and Proposed Branches.

It is expected to have the line completed to Lake Kenai by June, 1904. A line of boats will be run on this lake by the railroad company to serve the mining territory surrounding it.

Mr. G. W. Dickinson, formerly General Manager of the Northern Pacific, is President of the road. Mr. John O'Dowdle, Chicago, is Manager of Construction, and Mr. A. W. Swanitz is Chief Engineer. Mr. Swanitz has at different times had charge of large terminal and yard work in different parts of the United States, his last large work being as Chief Engineer of the freight yards of the Chicago Transfer & Clearing Company.

Foreign Railroad Notes.

A penny paper in England called *Answer* as an advertising dodge announced that any victim of a railroad accident who at the time should be in possession of a copy of that paper would have £1,000 paid to his next of kin. At the accident in Glasgow last July one of the dead had the paper in his satchel, and his sister is said to have claimed and received the thousand pounds.

Gen. Budde, for about two years Minister of Public Works in Prussia, but always before an army officer, and long as chief of the railroad division, has recently published a book on the French railroads during the war with Germany, chiefly devoted to the manner in which the German army used these railroads during its invasion. There seems to have been room for great improvement in this.

The Dresden Chamber of Commerce represents to the management of the Saxon State Railroads that an increase in the capacity of freight cars above 10 tons would be a disadvantage to the great majority of shippers, because they find it difficult to secure full loads even for the present cars. Many Germans are convinced that large cars, something of the American style, would greatly reduce the cost of transportation to the railroads, if the shippers would use them; and probably some shippers or combinations of shippers would be glad to make the changes in their works and yards which would enable them to use them, if they were allowed in the freight charges something like what the railroads would save by their use; but this would give them so great an advantage over the users of small cars that the latter, so long as they form the great majority, are likely to protest effectively.

The excavation of the Wachein Tunnel, one of the three long ones under way in the Austrian Alps, about the 20th of October opened two great springs, which flooded the whole tunnel. It has been decided that a drain must be built, the construction of which will require three months' time, during which no progress can be made on the tunnel.

New Passenger Equipment of the Chicago Great Western.

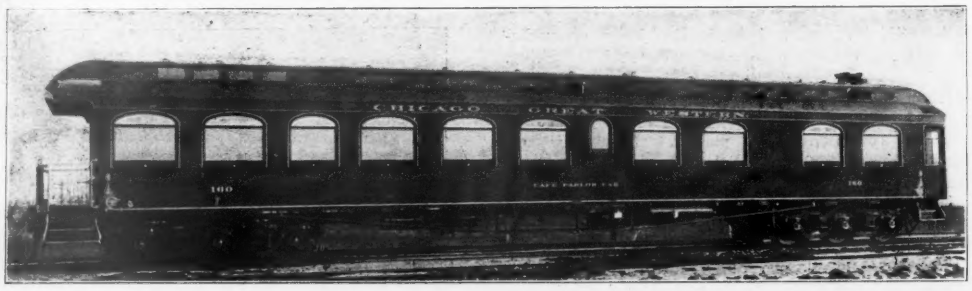
The Chicago Great Western expects to inaugurate through passenger service on its new Chicago-Omaha and Minneapolis-St. Paul-Omaha lines some time before the Christmas holidays. In preparation for this service the company has had some splendid new cars built by the Pullman Company. It comprises seven observation-café cars, three cars of the kind known on the Great Western as "club" cars, being a composite smoking and passenger or composite smoking and baggage design, and two dining cars. The new cars are not only unusually handsome, but the first two present some new ideas in interior design and arrangement which reflect great credit on Mr. Tracy Lyon, Assistant General Manager, with whom they originated.

The observation-café cars the Great Western calls "house" cars. They will be put on the day trains between Chicago and the Twin Cities. They are 70 ft. long over end sills and 79 ft. over all. The exterior is painted olive green decorated in gold. The wide windows in the three principal compartments and the narrow high windows in the kitchen and toilet rooms, differing from the usual oval windows, add to the exterior attractiveness.

The kitchen is entered from the vestibule and is shut off from the passageway and the interior of the car. The dining room has four tables with room for 12 persons, and is finished in mahogany. The style is colonial and is therefore plain, the effect being one of quiet elegance. The brass chandeliers and the hat hooks were specially designed for the cars. The compartment is roomy, with large tables and ample space between for the chairs. Meals are served by the card.

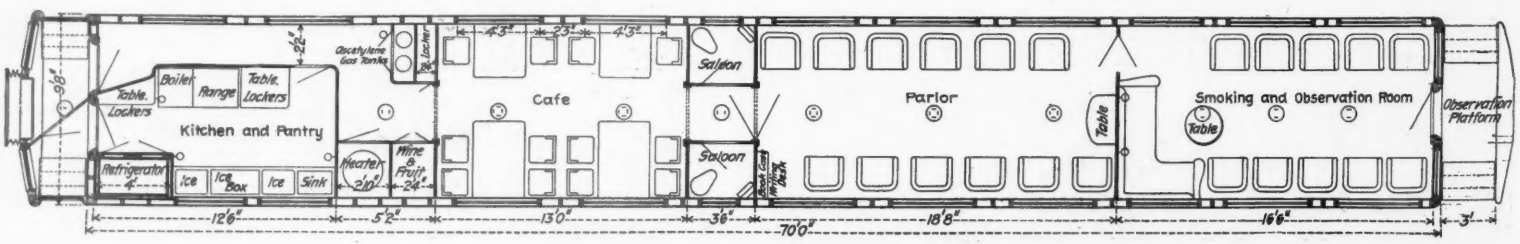
Next to the dining room and separated from it by a short passageway with a toilet room on each side, is the parlor, 18 ft. 8 in. long, and containing 12 chairs. Its style is also colonial, the walls being of green burlap with a frieze decorated in relief ivory, and woodwork of light mahogany. The floor is heavily carpeted. At one end of the room is a table for books and papers, over which is a large oval mirror set in an ivory colonial frame. In the corner at the opposite end is a bookcase and writing desk.

The smoking and observation room, 16 ft. 6 in. long, occupies the rear of the car. There are 10 easy chairs and also a large comfortable corner-seat with a convenient small table. The finish is empire style with oak woodwork, and considerable Ormulu brass is used in the decoration. The ceiling is domed and is an original and extremely attractive design. The end windows are cut down to the floor and the observation platform has a brass-rail, with provision for awnings for summer use. The cars are steam heated and are lighted with acetylene gas, the Adlake system being used.

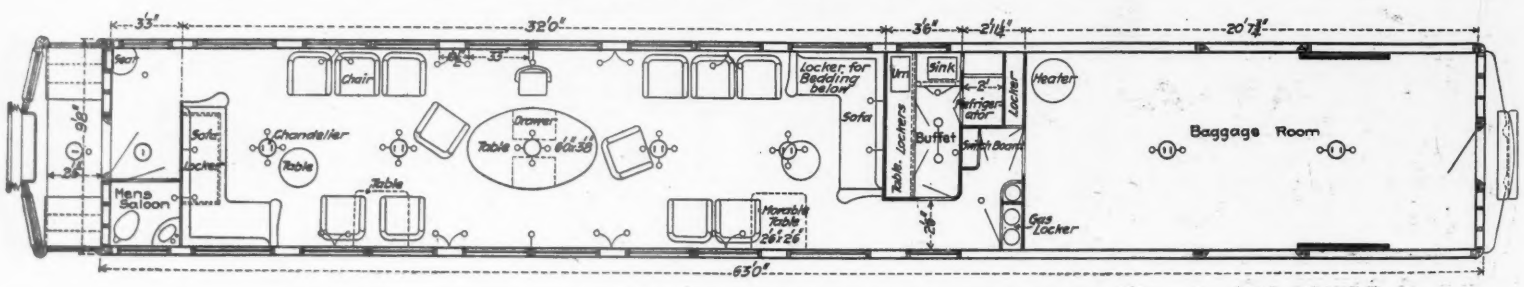


New Cafe Parlor Car of the Chicago Great Western.

The composite buffet smoking and baggage car shown is similar in general design to the "club" cars now used on the Chicago-St. Paul limited. The smoking compartment is 32 ft. long and its chief features of distinction from the usual car of this class are a 6-ft. center table surmounted by a tall lamp, which is used for a writing desk and for books and papers, and the large corner-seats in diagonally opposite corners with small tables



Observation-Cafe Car—Chicago Great Western.



Composite Smoking and Baggage Car—Chicago Great Western.

in front of them. These corner-seats enable small groups of men to gather without obstructing the passageway. The ceiling of these cars is the same design as for the observation room of the observation-cafe cars. The lighting fixtures are a combination for electricity and acetylene gas for the chandeliers and electric bracket fixtures for the sides.

The information concerning the equipment was obtained from Mr. Lyon, and the photographs and drawings from the Pullman Company.

Machine Rating in a Locomotive Machine Shop.*

The introduction of new machine tools and of new tool steel has increased the output of new work to such an extent that many are unable to determine exactly what can be done in machining and the best way to handle the work. The idea of tabulating work at the different machines suggested itself from tests of a 100-in. wheel lathe in turning tires, a 76-in. boring mill for boring the above, a 26-in. axle lathe for turning axles, several 37-in. mills used in driving box work, and a 42-in. wheel lathe in turning steel tired wheels.

It is possible to turn a pair of 84-in. plain tires in 2½ hrs. with a cut $^5/_{16}$ in. deep, and a feed of $^5/_{16}$ in., speed 18½ ft. per min., taken across a 6½ in. face. One hour and three minutes was required for the roughing cut. The finishing and handling of this pair of tires required one hour and 27 minutes. The total weight of metal removed per hour in the roughing cut was 291.6 lbs. This is an actual performance. The average time, however, is about 3½ hours.

A driving box for a 9-in. journal can be faced on both sides and counter-bored for babbitt on a 37-in. boring mill in two hours; then taken to slotter and slotted ready for brass and cellar in two hours; then brass is roughed out and fitted to box in 25 minutes on a 37-in. boring mill; then brass is taken to shaper, which finishes the edges in 25 min., and is finally inserted in box in 30 min., after which the box is taken to the babbitting room; time for removing to mill and babbitting is ½ hr.; from babbitting room to planer and fitted for shoes and wedges requires about 1.7 hrs. per box; then cellars are fitted at shaper in 2½ hrs.; then it goes to drill press, where one hour is consumed in drilling, and finally it is fitted for journal on a 37-in. boring mill in 45 min. The planing hours per box were taken from a test of 24 boxes, which were handled and planed in 41 hrs., but all the other work was figured singly. This entire work is all done in 66 ft. x 50 ft. of floor space, and in a total time of 11 hrs. and 47 min. per box. In the space above referred to are one shaper, four boring mills, one planer, one drill press, one slotter, one drop press, babbitting fire and tools and four air hoists.

A pair of 38-in. steel tired engine truck wheels can be gotten out in 1 hr. and 50 min., and this time is an ordinary performance—four pairs being turned out in 7 hrs. and 20 min. every day, and many times a good start is made on the fifth pair; one roughing cut $^5/_{16}$ in. deep and $^1/_7$ in. feed taken across face of tire and on outer portion of flange, then a finishing tool shaped as per standard contour and full width of face of tire, to finish. The first objection is yet to be heard from workmen in timing or regulating work in the manner indicated. Place a reasonable time limit on any piece of work, enough men to get it out in that time, and establish a method by which the work shall be done, it being assumed that men are paid the highest possible rate of wages, then there can be no valid objection to any machine doing all that belts will drive and steel will stand.

It has been truly said that the time lost by the improper methods of chucking work would in many cases more than counteract any time gained by proper feeds with high grade tool steels, and it is with the object of rectifying this mistake that up-to-date roads keep their tool department busy planning and making "short cut" tools. In a certain shop of 26 transverse pits, where a time limit of 23 days per engine is the practice, all heavy machines are taken care of by two traveling jib cranes, of five and ten ton capacity and which serve a total of 19,985 sq. ft. Both cranes travel on the same longitudinal track, thus reducing the danger of tying up the big machines in case of a breakdown. Most of the other machines are served by air hoists on runways. The proper arrangement of these has been a very important item in labor and time saving, as will be noticed in the driving box group with its four hoists. The time for transferring is so short that no time can be charged to it.

Objections to tabulating cards are raised by many because of the possible fallibility of information and differences of opinions on the work movements. This is the reason why the tables should be prepared, for differences will naturally exist as to movement of work and time required. They will find definite information by tables, which could not be attained otherwise. There is another point in favor of the tabulated card rating system in that it shows up in the clearest manner possible the remarkable increase in output by strictly modern machinery over that of an earlier date. An example is found in the wheel lathe tests, where we find that the new lathe will easily turn out work in 3 hrs. which would require the old machine 5 hrs.; also that the new steel tire lathe will turn out work in 2 hrs. which took an older tire lathe 3 hrs. to do. One new 30-in. boring mill will turn out rod bushings in 3 hrs.; the time the older machine took was 6 hrs. The card system is valuable in purchasing new machine tools, giving the scope of work and the saving effected by them. In the comparison of cards between employees of a road, or between roads, discussion should produce beneficial results. In contract shops the card system is not at all new, and speed bosses, whose business it is to set a speed and feed for all kinds of work, and adjust the respective cards, hold an important position in shop management. The chief benefit to be derived from a system to my mind is the clearer and more general knowledge of what our machines can do.

Anyone visiting the storage rooms and yards where finished or partially finished stock is kept in our large railroads will readily see that an immense amount of work is ready for the heavy repairs of an engine long before it reaches the shop. This work

*Abstract of a paper by Mr. J. F. De Voy, Mechanical Engineer of the C., M. & St. P., presented to Western Railway Club, Dec., 1903.

The Smoking Room in the Composite Buffet Smoking and Baggage Car.

Parlor of the Observation-Cafe Car.

Dining Room of the Observation-Cafe Car.

can be definitely timed and placed on cards, which compared will show us where we stand with similar work on other roads. Individual tables for pins, studs, tap bolts, setscrews, are readily prepared.

To one making out a table of tests, the fact that high grade tools will crumble or break off a cutting edge with but one-half the cut, or even less, in an old machine, with every other condition identical, cannot be overlooked. The lost motion in an old machine is not a lost motion, but a burning motion, in its telling effect on roughening and shaping tools. This should and does affect the character of the work, and it is desirable to keep up a first-class character of work. An important consideration greatly affecting machine output, and very troublesome, inasmuch as it is a variable, is the amount of stock to be removed. In castings we find the "variable" in its "less degree," and in small forgings it is not immoderate, but when we finally hit on the "greater degree," in the familiar form of a frame, an axle or main rod, we feel that we have come to a guessing point. This is the reason why frame and rod work cannot be definitely calculated except in the speed and cutting list. Some of the new machines have done very good work on these parts which would not be recognized by outsiders in a card system. The table of speeds and cuts is prepared from daily performances, and not, as in some tables, from tests of about an hour's duration, and are intended to keep the tool in good condition without grinding.

The Canadian Railroad Law.

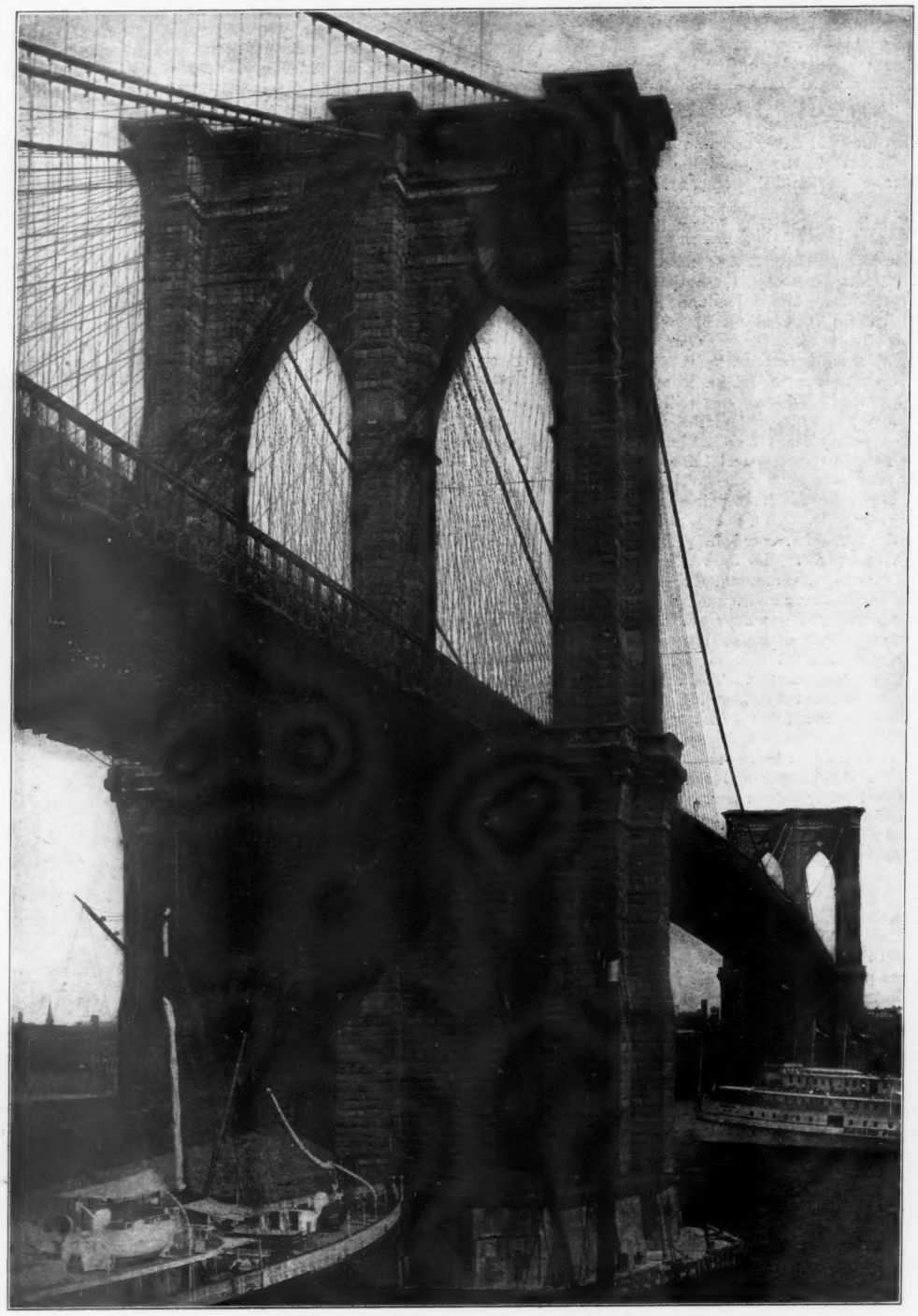
The revised railroad law of the Dominion of Canada, known as "The Railway Act, 1903," was signed on October 24. It consolidates the laws of the Dominion respecting railroads, abolishes the Railway Committee of the Privy Council, and establishes a Board of Railway Commissioners. The principal divisions are (4) Railway Commission, (5) Practice and Procedure, (6) Organization of Company, (7) Construction of Railway, (8) Inspection, (9) Operation, (10) By-Laws, (11) Tolls. The Act does not come into force until proclaimed by the Governor General, and the sections affecting rates will not come into force until three months after the date named.

The three commissioners are to be appointed by the Governor in Council and the Commission is to be a court of record. The term of office is ten years, but a commissioner shall cease to hold office when he reaches the age of seventy-five. The Governor is to designate one of the three as Chief Commissioner. The salary of the Chief Commissioner is $10,000, and of the other two $8,000 each. Usually two commissioners must sit to hear every case, and on questions of law the opinion of the Chief Commissioner is to prevail. In a case where there is no opposing party and no notice is necessary, a single commissioner may act alone for the Board. A commissioner is not disqualified to act in a case because of interest in it, or of kindred to persons interested, but the Governor *may* appoint a disinterested person to act in his place. The commissioners must devote their whole time to their duties as such, and must not hold any office or employment inconsistent with the commissionership. The Secretary is appointed by the Governor; salary not more than $4,000. The Governor may appoint experts to advise the Board.

The Board will have jurisdiction to hear and determine all kinds of complaints against railroads; may issue injunctions, decide matters of law and fact, and have all powers, rights and privileges of a Superior Court. Its decision as to whether a party may or may not be heard in a suit shall be final. It may start inquiries on its own motion and exercise the same powers as upon an application or complaint. It may make orders limiting the speeds of trains in towns; for the safety of employees passing from one car to another; for the coupling of cars; requiring shelter for employees; requiring spark screens and fire guards; and generally for the protection of persons and property; it may provide penalties for offences against any of these regulations.

The pendency of a suit in any other court shall not deprive the Board of jurisdiction to hear and determine the questions of fact in the case. The decisions of the Board are to be final, except that (1) the Governor in Council may vary or rescind them and may make an order, which shall be binding on the Board and all parties, and (2) an appeal may be taken to the Supreme Court of Canada upon a question of jurisdiction; also (3) on a question of law, if the commissioners themselves decide that it is a question of law, and shall permit the appeal. When the Board orders the construction of any works or repairs, alterations, etc., it may decide who shall pay for the work, and apportion the expense. The Board, or the Minister, or any person appointed under the Act, may enter upon and inspect any railroad premises, may inspect any cars, engines, or other property, require the attendance of witnesses and replies to questions, etc. No person shall be excused from attending or testifying on the ground that he may criminate himself; but his testimony shall not be used against him, except in a prosecution for perjury in giving such testimony.

The sections regulating the construction of railroads are very full and minute, dealing with limitation of time; general powers; location; mineral lands; taking or using lands of the Crown, of other companies, etc.; branch lines; crossings and junctions; navigable waters;



Brooklyn Bridge, Opened May 24, 1883.

highway crossings; telegraph and telephone lines; drainage; bridges and tunnels; and wages of laborers.

A crossing of one railroad with another or a junction of two railroads may be made only on leave being obtained from the commission, and a plan and profile must be submitted. The commission may order interlocking signals, derailers, and any appliance deemed necessary for safety; and may then permit trains to pass over without first coming to a stop. The commissioners must not permit a railroad (to be used as a street railroad) to be laid along any highway in a city or incorporated town without the consent of the municipality. It may order highway crossings to be above or beneath the railroad; and in the case of existing railroads may require the company to submit plans for separating the grades, and may make any order in respect thereto, as in the case of a new railroad.

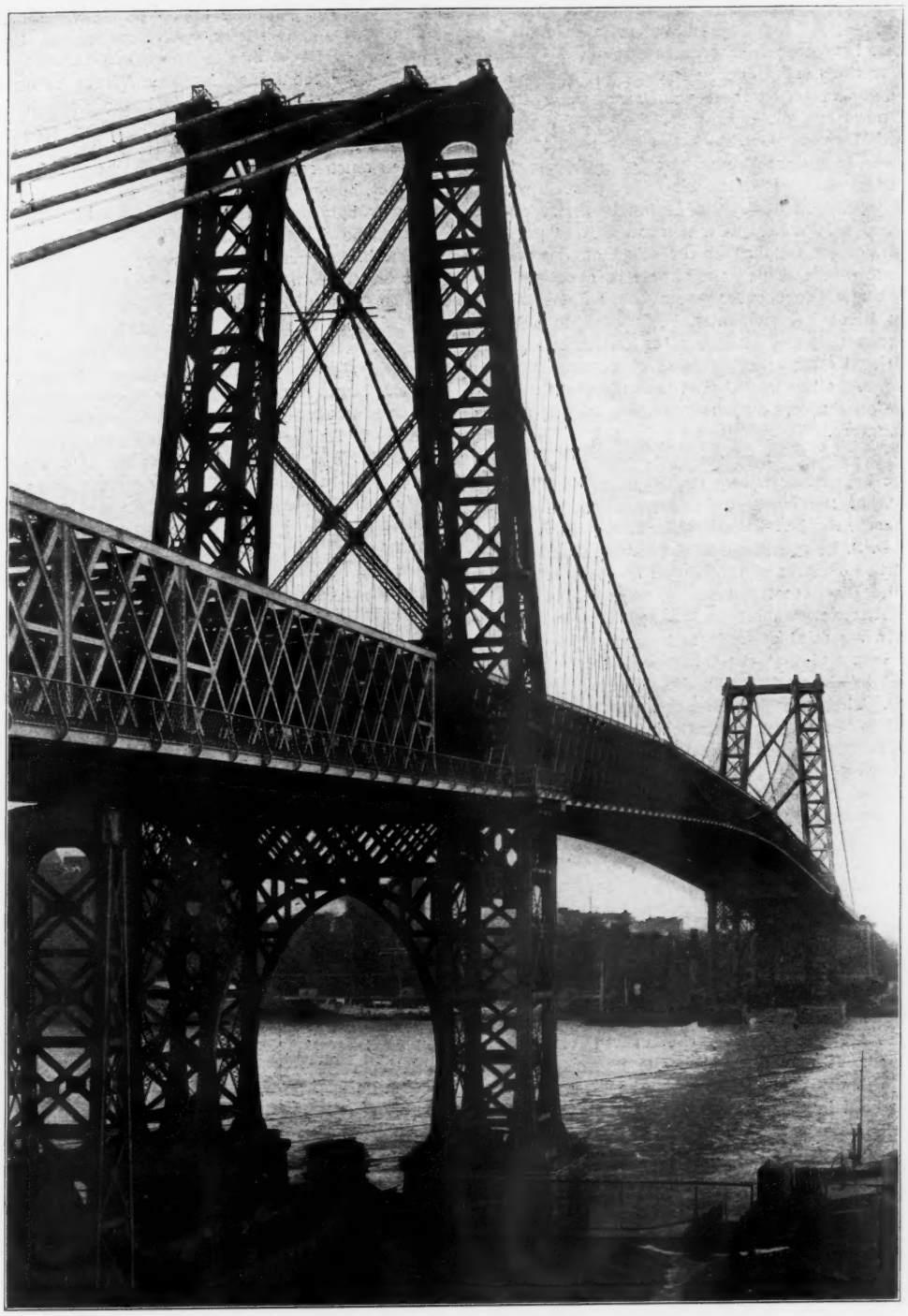
Inspecting engineers may be appointed by the Minister or the commissioners subject to the approval of the Governor in Council.

Operation. Power brakes must be provided, on all trains, sufficient to enable the engineer to control the speed; on passenger trains the brake must be automatic. In general, the provisions regarding brakes and couplers are similar to the laws of the United States on the same subject, but the principal requirements do not come into effect until January 1, 1906. There is a clause requiring grab irons on freight cars, but the commission has power to modify it, if necessary to secure improved appliances or designs. The Board may make exceptions to the rule but shall not modify the requirements. The Board shall endeavor to provide for uniformity in the construction of rolling stock and in the rules for running trains; may regulate the number of men to be employed on trains; may forbid the use of wood fuel for locomotives in any district, and generally may protect the safety of the public and employees. Frogs and switches must be "packed." Locomotive valve oil cups must be accessible from the cab. At stations having telegraph offices a blackboard bulletin must be provided for informing the public about delayed trains. In Quebec, the bulletin must be filled out in English and in French.

Accidents attended with serious personal injury or badly damaging a bridge or tunnel must be reported immediately to the commission, on pain of $200 forfeit for every day during which the omission to report continues. The Board is to prescribe the manner and form of reports and to appoint agents to inquire as to causes of accidents and means of prevention. On the report of these agents the Board may order a railroad to suspend or dismiss an employee.

Tolls.—A railroad company may prepare and issue tariffs of tolls, such tariffs to be submitted and approved by the Board. No money may be collected for transportation except in accordance with an approved tariff. Unjust discrimination is prohibited. The "long and short haul rule" must be observed, but the commission may, if necessitated by competition, allow a greater charge for a shorter distance. Railroads are forbidden to pool their freight or earnings without leave from the commission. Whenever an apparently discriminating rate is shown to exist, the burden of proving that it is not unjust shall lie on the company. In deciding on the justice of joint rates, partly by rail and partly by water, the commission may require the railroad company to declare forthwith, or in default thereof may itself determine, what portion of the charge is applicable to the railroad. The commission shall prescribe a freight classification and shall "endeavor" to have uniform freight classification throughout Canada, having due regard to all proper interests. The commission will prescribe the forms of tariffs and may order the consolidation and reissue of tariffs which have been amended a number of times. Freight rates are to be based on three standard mileage tariffs. One, called the standard, naming maximum rates; a second for commodity tariffs; and a third, competitive tariffs. Advances in rates must be announced 10 days beforehand and reductions three days before. The commission may authorize competitive tariffs to be changed without notice.

In the chapter on offences and penalties, every person



Williamsburgh Bridge, Opened Dec. 19, 1903.

who sells or gives intoxicating liquor to a railroad employee on duty is made liable to $50 fine or one month's imprisonment. Prosecutions against a railroad for penalties less than $100 can be made only on obtaining leave from the commission. Among the things required in the semi-annual returns made by the railroads is a list of all accidents and casualties, with nature and causes, and all particulars. The Minister may prescribe the form of the returns on this and other subjects and may require special returns of serious accidents.

The Williamsburgh Bridge and the Brooklyn Bridge.

On December 19 the new Williamsburgh bridge will be formally opened with considerable ceremony, although one of the roadways and the foot walks are the only portions of the bridge which can be used for thoroughfares at present. The accompanying photographs have been taken with a view to presenting a graphic comparison of the old and new bridges across the East river, and are on practically the same scale. A number of articles have been printed in the *Railroad Gazette*, from time to time, containing drawings, specifications, and comment on the progress of the work on the new bridge, but for ready reference the following tables give the principal dimensions of the Williamsburgh bridge and also of the old Brooklyn bridge.

Williamsburgh Bridge.

Length of main span, center to center of towers, 1,600 ft.

Length of entire bridge between terminals, 7,200 ft.

Width of main span over all, 118 ft.

Minimum height of bridge above mean high water of spring tides at pier head lines, 121 ft.

Minimum height of bridge for 200 ft. on each side of center of main span, 135 ft.

Height of masonry of tower foundation above high water, 23 ft.

Height of center of cables at top of towers above high water, 333 ft.

Width of carriage ways each, 20 ft.

Width of two elevated railroad tracks, center to center, 11 ft.

Width of four trolley tracks, center to center, each, 9¾ ft.

Width of two foot walks, each, 10.5 ft.

Width of two bicycle paths, each, 7 ft.

On the New York side the north caisson is 54.8 ft. below low water mark. The south caisson is 70 ft. below low water. On the Brooklyn side the north caisson is 110 ft. below low water and the south caisson 90 ft. The bridge has two continuous stiffening trusses supported on rocker arms on the main towers and on the main floor-beams, and their cantilever ends support the river ends on the land or connecting spans. The bridge has been about seven years building, work having been commenced late in 1896.

Brooklyn Bridge.

Length of main span, 1,595 ft. 6 in.

Length of each land span, 930 ft.

Length of Brooklyn approach, 971 ft.

Length of New York approach, 1,562 ft. 6 in.

Total length of carriage way, 5,989 ft.

Total length of bridge, with extensions, 6,537 ft.

The roadway is 86 ft. broad divided into five sections, the two outside for vehicles and trolley cars, the two inner for cable and electric trains, and the middle one, 12 ft. higher than the others, for foot passengers.

Height of bridge in center of river span, above high water, 135 ft.

Height of floor at towers, above high water, 119 ft. 3 in.

Height of towers, above high water, 272 ft.

Height of towers above roadway, 153 ft.

The Manhattan tower contains 46,945 cu. yds. of masonry, and the Brooklyn tower contains 38,214 cu. yds. of masonry.

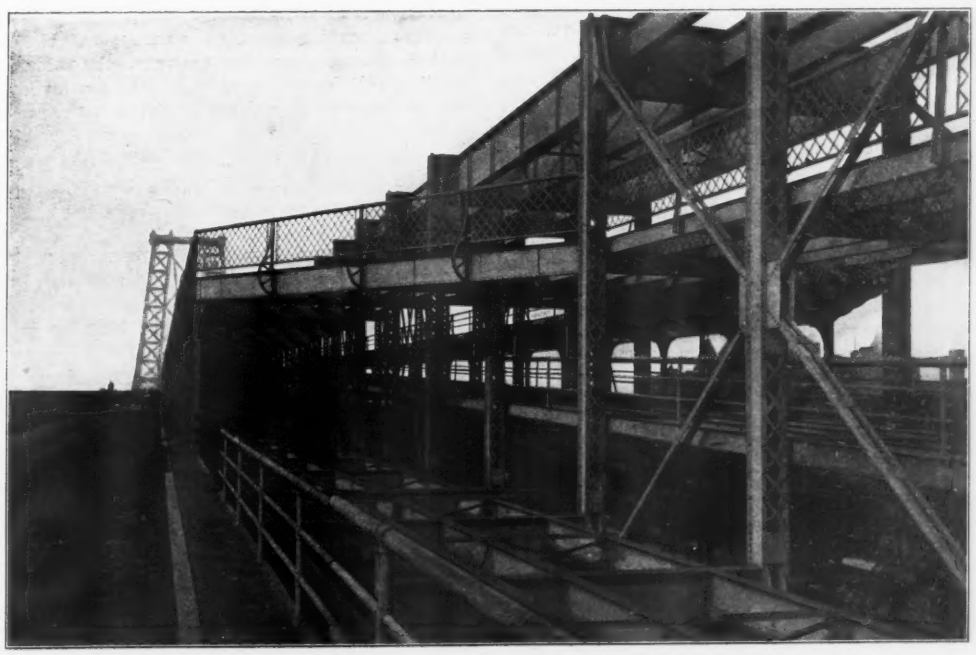
The depth of the Manhattan tower foundation below high water is 78 ft., and the depth of the Brooklyn tower foundation below high water is 45 ft.

Dimensions of towers at high water line, 140 x 59 ft.

Dimensions of tower at roof course, 136 x 53 ft.

Work was begun on the Brooklyn bridge Jan. 2, 1870, and the bridge was opened to traffic May 24, 1883, so that the elapsed time between commencement and completion was about 13 years. The actual building operations only required about 10 years, however, the balance being time lost while work was under suspension owing to lack of funds. The tops of the towers have never been finished; according to the original design they were to be 6 ft. higher than at present. The cost of building the Brooklyn bridge, proper, was about nine millions, and real estate and terminals brought the total cost to the neighborhood of 15 millions. The steel work and foundations of the Williamsburgh bridge will cost about seven millions, but the cost of the terminals, chiefly owing to the increased cost of real estate, will probably bring the total cost to nearly 20 millions. Washington A. Roebling was Chief Engineer of the Brooklyn bridge; Leffert L. Buck, of the Williamsburgh.

Chinese newspapers have published a report that Chinese capitalists have subscribed the capital for building a railroad from Pekin northwest to Kalgan, the gate of the Great Wall on the Caravan route across the desert to Kiakhta and Irkutsk. The story may well be a mere newspaper yarn, as "one of the richest merchants of Formosa" (which now belongs to Japan) is credited with subscribing a million, and a famous eunuch of the court another million, which he is said to have received from the Russians for that purpose. Also it is reported that 200 Russian pioneer troops have arrived at Kiakhta, and the conclusion is drawn that Russia is about to render useless its existing railroad from Lake Baikal to the Pacific by building a new short line to Pekin, more than a thousand miles long, nine-tenths of the way through desert. From Pekin to Kalgan, in China proper, the distance is only about 100 miles, and a railroad for that distance may well be a reasonable project; but to build through the desert 900 miles further to secure a through traffic before the existing Chinese Eastern Railroad has secured any to speak of does not seem the part of wisdom. It is not improbable, however, that a preliminary survey may be made.



Williamsburgh Bridge, Showing Arrangement of Tracks, Roadways and Footwalks.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

With the formal opening this week of the new Williamsburgh bridge over East river, connecting Manhattan and Brooklyn boroughs of the city of New York, comes the announcement that the office of consulting engineer of the city bridge department is to be abolished on December 31. It happens that this office is held by Mr. Leffert Lefferts Buck, who designed the bridge and who has superintended every detail of its construction during the past seven years. Mr. Buck has made his great fame in solving more difficult engineering problems than is this one. The substitution of steel towers for the failing stone towers of the Niagara Suspension bridge, without interrupting train service, was an unexampled feat of design and execution which alone entitled him to place among the foremost bridge engineers of the world. Nevertheless, the Williamsburgh bridge, due to its size, its importance and its metropolitan location, may rightly be considered as the crowning work of this great engineer's long and busy life. Moreover, the bridge is not done. The "opening" at this time, when only the least important of the means of transit over the structure are available, is due to a retiring administration's anxiety for display, and for place in the annals. There are still to be solved, in adapting the bridge to its uses for foot-passengers, teams and electric cars, engineering problems of the highest importance, quite comparable in size and difficulty to those with which Mr. Buck has already dealt. But, in the language of Charles Sumner: "This child is to be given to a nurse who cares not for it." This sacrifice to human vanity of a great city's interest, and the humiliation of a great and modest man, is a scar on the record of a reform administration. Worse and more enduring is the apparent lesson to young men that reward comes as the result of other qualities than good performance.

The Interstate Commerce Commission is reported to be discouraged, in that its sphere of influence, or rather its work, is lessening, and it wants more legislation. As well might the Supreme Court feel discouraged at a falling off in its business. Happy the people whose annals are bare of convulsions and tragedies in history books; and happy the country whose judges have nothing to judge. The most useful function of the Commission, in the rate-making field, is to hear, formulate and simplify the people's grievances against the railroads; and if it does that successfully it may be content. The redress of the grievances is another matter. As has been shown many times, the cold reasoning of the higher courts, or the colder process known as the trying out of commercial forces, often proves the only power that can redress rate grievances in a way to compel acquiescence by the aggrieved parties. The Commission, constituted as it is, and with its conflicting interest as a prosecuting body, is not coldly judicial. It is true that the lack of important issues before the Commission at present is not wholly due to lack of grievances; some shippers have stopped complaining because they despair of redress through the Commission or the Courts; but perhaps they, and the rest of us, should accept the conclusion of the Philistine, that these grievances may for the present go unredressed because they block the way to the solution of more important things. No one objects if the Commissioners, when nothing important presents itself, spend their time in trying to figure out the value of a boot heel at a non-competitive point 138 miles west of Omaha; or the effect on the people's happiness of checking the supply of chocolate from Samoa and the encouragement of shipments from Porto Rico; but, evidently, the people do object to the proposition to change rates on important commodities by the quick process of a commission decision. At all events, that is the only practical interpretation that can be put upon the present attitude of Congress.

The arguments before the Supreme Court on the appeal of the Northern Securities Co., the Great Northern, the Northern Pacific, J. J. Hill, J. P. Morgan, D. S. Lamont, and others vs. the United States, from the decision of the United States Circuit Court for the District of Minnesota, were closed Dec. 15. The Attorney-General maintained that the merger was in restraint of trade and contrary to the Sherman law, and that the thing accomplished was not varied by the variation in the manner of bringing it about. The counsel for the companies made reply in detail to the specific allegations brought by the Government, and held that intent to restrain trade was not unlawful until put into effect, and that no claim or argument had been made that, in fact, trade has been restrained. In a previous review of the case, printed in the *Railroad Gazette*, Aug. 7, 1903, it was pointed out that the most telling arguments of the defendants, from an economic and commercial standpoint, have already been heard and overruled by the court, and that it seemed to be incumbent upon them to show that all the facts and circumstances connected with the organization of the company established neither an actual restraint of trade nor a combination to restrain it. This, in the main, has been the course of argument pursued. It now rests with the Supreme Court to decide finally whether or not majority stock holding in parallel interstate lines is unlawful. In case the decision is unfavorable to the Securities Company, a collateral question of great interest is at once raised regarding the status of the Pennsylvania, the New York Central, the New York, New Haven & Hartford, the Boston & Maine, and many others, in their stock ownerships and leases of parallel lines. It may well be that the Supreme Court, with its prerogative of relatively free and unhampered decision as the highest tribunal, may find grave complications attendant upon the literal enforcement of all the ramifications which are seemingly within the scope of the Sherman Anti-Trust law, and may hand down a decision limiting and defining the broad terms in which the law is expressed.

German and American Locomotive Competition.

Price making for locomotives for export has for the past three years been subject to unusual "disturbing forces," and without a study of them the distribution of orders is not quite understandable. The English makers have been restrained by their, comparative, high cost of production, and our own builders by home orders to the limit of their capacity during a considerable part of the period. About two years ago the American Locomotive Company declined to bid on an important Japanese order. Later, at another Japanese letting the American company made a price which was found to be $1,000 per locomotive higher than the bid of a German maker. This was at the time unexpected, but it seems to be explained by the following extract from the just published annual report of the Saxon Machine Works, of Chemnitz:

> The unprofitable operations of the last year do not allow us to declare a dividend on the shares of our company. This unsatisfactory result was in the main caused by the unsuccessful working of our locomotive building branch, which forms the backbone of the company's industry. This branch, whose output in former years footed up to $1,475,600, turned out only $627,368 worth in 1902-3. Home orders for locomotives declined on account of the existing depression and the consequent diminished railroad traffic. In order to keep up our locomotive branch and maintain our staff of employees therein, we were compelled to seek for orders in distant markets new to us, and to obtain such orders we were forced to accept prices which show losses instead of profits.

The truth-telling quality of this report is admirable and is worthy of voluntary emulation by our own great industrial corporations which are about to be forced to publicity by the new law compelling full returns of details of operation to the United States Department of Commerce and Labor.

Last year the Saxon Machine Works received a contract for 20 locomotives for the Canadian Pacific at prices considerably below those quoted by builders in this country. The remarkably low price caused much comment at the time. It is an interesting fact, however, that the same road recently asked for new bids on a similar lot of locomotives. The bid of the German builders was several thousand dollars higher than the first order. This means either that the German builders have learned something of the cost of an American locomotive, or that they have decided to stop taking orders at a loss, or at no profit, merely to keep the plant going. Some time ago the representatives of a German builder came to this country to look over drawings submitted by a Superintendent of Motive Power of a large American road. As the story goes, the German representatives obtained the blue prints, went into a private room, and in about an hour came out and offered their bid. It is certainly incredible that an accurate estimate of the cost of locomotives could be made in that short time. It happened, however, that they were pretty good guessers and lost the contract by only about $1,000 per locomotive.

Further light, if it is needed, is thrown on the subject by a statement made by the president of the French Mechanical Construction Company to the last annual meeting of its stockholders:

> Recently in tendering for locomotives in Spain we found ourselves in competition with German builders who had lowered their prices to a point apparently below cost, though they were receiving orders from their own government at prices better than we can obtain for similar work in France. This condition of affairs is difficult to meet.

Under bidding by German makers has been commonly ascribed to their cheaper production by reason of their lower wage schedule. The average number of workmen employed during 1902-3 by the Saxon Machine Works was 3,197, and the maximum, 3,561. The wages paid during the year amounted to $728,387, which is an annual average of $228 per man, based on the average number of employees. This is an official statement, and no comparable official statement is made public by the locomotive works in this country; nevertheless, we have reason for estimating the average wage in our locomotive works at $650 a year. The output of American workmen with American tools, compared with that of British and German workmen, has been determined in many special cases, but it is not capable of general application. We know that it has been much larger, and that our competitors seem to have been slow in learning the use of labor-saving tools and the economic advantage of "speeding her up." We are also slowly learning that skilful workmen, freed from union restriction, and spurred by the piece-price system, can tend one, two and three machines and at the same time raise the speed so as to triple their productiveness. Nevertheless, it is possible that the labor cost of a German-made locomotive is somewhat less than ours. It is interesting to recall that the late German deliveries of locomotives to East India were about a year behind time; but these were made on English specifications, requiring new patterns, and probably some new methods. An incident in the filling of this contract was that a foundry foreman worried himself to insanity and committed suicide.

The principles governing the solution of the whole matter are covered in the following quotation from Mr. George S. Morison's "New Epoch":

> The profits of the new epoch must be made, not by buying cheap and selling dear, but by reducing the cost of production. The most successful man will not be the one who has the shrewdest salesman to dispose of his goods, but the one who can manufacture his wares more cheaply than any one else engaged in the same work. The most successful transportation line will not be the one whose agents are most active in securing business, but the one which is the most closely handled, which can carry its freight at a less cost to itself than any competing line. Permanent success will depend not on commercial drummers, but on the civil engineer: not on the shrewd guesses of the so-called business man, but on the accurate knowledge of the manager who knows what his tools are, who knows what it costs to produce, who knows the defects of his plant and the features in which it may be improved, who, in fact, is applying all the intelligence of an educated mind, not to getting the better of some other man who may know a little less, but to getting the best work possible for himself and his employers out of what he has to work with.

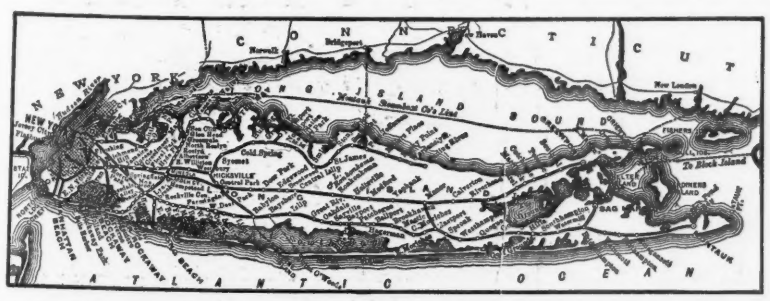
The Long Island Railroad report for the last year (ending with June) illustrates the peculiar disabilities of an insular or peninsular railroad. By its situation it is substantially deprived of through traffic. In this particular instance, having three parallel lines and many branches on an island about 20 miles wide and 110 miles long, a very large part of which is barren, it has but an insignificant amount of freight traffic. With a great city at one end, suburbs for 25 miles beyond it, and sum-

mer resorts pretty much everywhere, nearly every square mile of territory thinks itself abused unless it has a station of its own, with a lightning express stopping there at convenient hours in the morning and evening. In the few places where there is a considerable amount of freight received or shipped, there is a harbor near, and cheap water transportation can be had. Cut off by the East River from the main land, freight exchanged with all other railroads must be transferred by boat. The very location of the lines in the western part of the island, having been made by independent and competing companies, is ill adapted to an economical train service. The contrast with other railroads entering New York is great. The New York, New Haven & Hartford, for instance, as nearly as possible a parallel line, serves its New York suburban traffic with less than half the mileage of road on which the Long Island runs suburban trains, and has a tremendous through passenger traffic to support it, not to speak of freight. How little the Long Island Railroad is a freight road may be judged by the fact that its freight movement is equivalent to only 195 tons each way daily over its whole mileage—easily handled by one train every other day; while it has 883 passengers each way daily. Compare this with the 1,095 tons and 749 passengers daily on the New Haven road, or even the 1,087 tons and 136 passengers of the whole United States. Fortunately for the Long Island Railroad, the city is growing all over the western part of it, and with the completion of the tunnel uniting it with New York and the Pennsylvania Railroad it is bound to grow faster than ever, making a very large part of it rather a city than a suburban railroad, with not only a heavy travel but a very large short-haul freight, which, if it does not count up in ton-miles like hauls between New York and Boston or Philadelphia, may count handsomely in earnings and profits, taking the place of cartage to a considerable extent.

Long Island Railroad.

The report for the year ending June 30 presents a showing not quite so good as last year. Gross earnings were $6,440,992 as against $5,883,607, an increase of $557,385; but expenses increased $676,417 in the same period, to a total of $4,787,968, leaving net earnings of $1,653,024; $119,032 less than last year. Gross income after addition of interest on investments was $1,990,087; $114,056 less than last year; and from this it was necessary to deduct an increased interest on funded debt, together with somewhat increased taxes, and other charges, causing a reduction in net income from $544,255 in 1902 to $305,588 in 1903. The percentage of operating expense to gross earnings in 1903 was 74.34 as against 69.88 in 1902. In commenting on the situation President Baldwin says that operating expenses were on a new plane during the year as a result of the extraordinary cost of fuel and other supplies, the increase in wages and in rental charges under per diem, and in the outlay for additional express facilities, and that these expenses could be offset only by increased business. The increase, amounting to 8.16 per cent. in tons carried, in the relatively less important freight traffic, and 5.66 per cent. in passengers carried, was evidently not sufficient to make up for the increase in the cost of working the line and of making necessary betterments.

The peculiar position of the Long Island Railroad, in view of the fact that in spite of its length of 210 miles between terminals and its total of 392 miles of line worked, it does business possessing in many ways the characteristics of that of a purely suburban line, receives comment further in another column this week. It is sufficient here to call attention to the fact that passenger earnings, which amounted to $3,592,614, exclusive of express and mails, were nearly 56 per cent. of the total earnings. A table of average earnings, expenses, and net earnings per mile, discloses the interesting and striking fact that there were no net earnings at all, properly speaking, from passenger traffic, in spite of the importance of this branch of the business, as the



Long Island Railroad.

average earnings per passenger per mile, amounting to 1.4 cents, were exactly offset by the average expenses per passenger per mile. There was, however, a considerable margin of profit per passenger train mile, owing to express and mails carried.

The year was marked by large expenditures for general improvements, amounting to $1,060,104, of which $255,402 was charged to capital, $221,462 against the year's income, and the balance provided for through the extraordinary expenditure fund of $583,240 previously set aside from income. Work done includes double tracking, cost of Montauk Extension railroad, cost of New York Bay Extension railroad, and cost of Great Neck & Port Washington railroad. The three roads above named were merged during the year into the Long Island Railroad and the funded debt shows an increase of $800,000 by reason of this merger and the consequent assumption of the $600,000 Montauk Extension and $200,000 New York Bay Extension 5 per cent. bonds. Of the Long Island unified 4 per cent. bonds due in 1949, $3,468,000 were delivered to the company during the year by the Trustee for permanent improvements and betterments and for the redemption of underlying securities, as provided for in the mortgage. The total authorized issue of these unified mortgage bonds is $45,000,000, the rate of interest not to exceed 4 per cent. The total amount issued to date is $9,828,000, and the rest of the bonds are held in reserve to retire outstanding obligations, and also to provide for the company's one-half of the cost of the Atlantic avenue improvements in Brooklyn; to provide for the abolition or change of grade crossings, to provide for change of motive power in case this is desired, and to be issued for permanent betterments and the acquirement of new property. It is provided that all securities acquired by the use of these unified bonds shall be held by the Trustee as additional security for the bonds, and that all property acquired by the use of the bonds shall be subjected to the lien of the unified mortgage. The company reserves all right to redeem any or all of the unified mortgage bonds on any interest day at 110 per cent. and interest.

Work on the Atlantic avenue improvement, which has been fully described in previous issues of the *Railroad Gazette*, is reported as having progressed favorably. The two elevated sections are already in operation, although the remaining two sections, which are subway, will not be completed for another year. Indications point to a constant increase in the local traffic, which will necessitate double tracking parts of the line and furnishing largely increased facilities, and it is to be expected that the completion of the Pennsylvania tunnel under the Hudson River, New York City, and the East River, will throw a large additional volume of traffic upon the system.

Statistics of operation follow:

	1903.	1902.
Total mileage worked	392	396
Passenger earnings	$3,592,614	$3,401,228
Freight earnings	1,784,056	1,605,975
Mail, express and miscellaneous	1,064,322	876,404
Total earnings	6,440,992	5,883,607
Maintenance of way	735,879	710,697
Maintenance of equipment	592,592	535,234
Conducting transportation	3,291,162	2,724,759
Total operating expenses	4,787,968	4,111,551
Net earnings	1,653,024	1,772,056
Net income	305,588	544,255

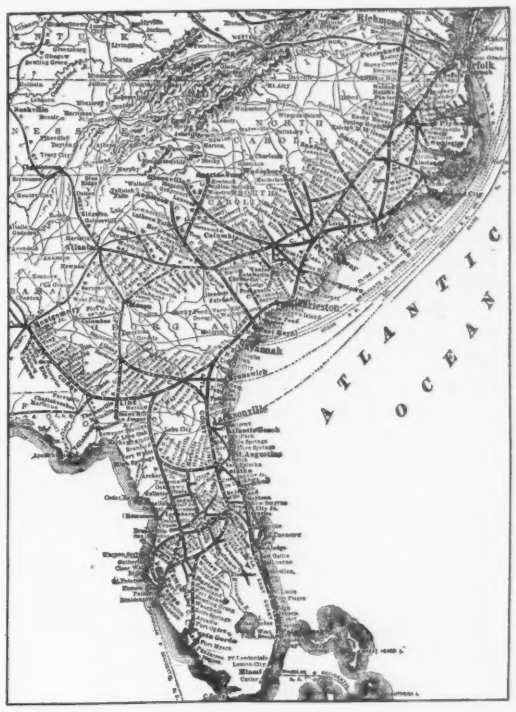
Atlantic Coast Line.

A little more than a year ago final arrangements were made for transferring to the Atlantic Coast Line ownership of a majority interest in the outstanding $60,000,000 capital stock of the Louisville & Nashville, following as a sequel to the speculative buying of the latter by outside parties in April, 1902, the complication which resulted from the sudden determination of the Louisville & Nashville management to put new stock on the market during the continuance of the high prices while the buying was going on, before it had been listed, and the transfer of control from Gates to Morgan.

The current Atlantic Coast Line report, therefore, is the first to be issued since the completion of this episode, and it says that the stockholders of the company by a vote representing 91 per cent. of all the stock then outstanding and being all the shares represented at the meeting on Nov. 17, 1902, approved the purchase of 306,000 shares out of a total of 600,000 shares of the Louisville & Nashville stock. These shares have been pledged as collateral for the issue of $35,000,000 of 4 per cent. bonds bearing date Nov. 1, 1902, and payable in 1952. These bonds of the Atlantic Coast Line, together with $5,000,000 Atlantic Coast Line stock and $10,000,000 cash were paid as consideration for the 306,000 shares of Louisville & Nashville stock. Surplus profits of the Atlantic Coast Line have since been applied to the cost of the stock by which its book value has been reduced to $45,554,220. The Louisville & Nashville mileage owned or leased which came under the control of the Atlantic Coast Line by this purchase aggregated 6,133.

In addition to this most important purchase the Savannah, Florida & Western was taken over on July 1, 1902, and the St. Johns & Lake Eustis, the Sanford & Lake Eustis, the Florida Midland, the Florida Southern and Sanford & St. Petersburg railroads were acquired at the same time. Exclusive of the Louisville & Nashville mileage, therefore, which is operated separately and the earnings from which appear in the income account as dividends, under other income, a mileage of 4,139 is now owned and operated under lease, as against 1,756 last year, and if the controlled Louisville & Nashville mileage be added to this it will be seen that the Atlantic Coast Line owns or directly controls well over 10,000 miles of railroad, entitling it to a place in the first group of the great railroad consolidations of the present time.

Owing to the changes in mileage, traffic comparisons with last year are not of much use. It is, however, interesting, although not particularly valuable, to know that the gross earnings per mile of road worked out to $4,755 as against $4,868 in 1902, on the old Atlantic Coast Line proper; that operating expenses per mile amounted to $2,878 this year as against $2,903 in 1902, and that net receipts per mile amounted to $1,878 as against $1,965. Freight earnings per mile in 1903 were $3,394, and last year they were $3,504, while passenger earnings this year were $926 as against $999. Thus it



Atlantic Coast Line.

appears, as would naturally have been expected, that traffic is slightly less dense, on the extended system, than formerly.

Gross earnings from operation this year amounted to $19,682,455 and operating expenses and taxes to $12,612,337, leaving net income from operation $7,070,119. To this is added other income of $1,152,952, which includes the six months' dividend of 2½ per cent. on the Louisville & Nashville, while interest and rentals includes nine months' interest to June 30, 1903, on the entire issue of $35,000,000 of bonds, secured by the Louisville & Nashville stock as collateral. The total income was $8,223,071, interest and rentals $5,207,982, and net income $2,993,028.

TRADE CATALOGUES.

The Voltaphone is the title of Bulletin No. 137 of the Stanley Electric Manufacturing Company, Pittsfield, Mass. A new instrument is described which is a combination of the voltmeter, the telephone and the clock. It is important that the engineer in charge of a generating station should know the drop in potential at the several centers of distribution. The usual practice is to send out men with portable instruments and have them telephone the voltage readings to the central station. The voltaphone is designed to perform the same service required of the attendant, if he were stationed with his voltmeter and telephone at the distribution point. The voltmeter side of the instrument is connected to the service main in the usual way and telephone connections are made the same as in regular telephone work. The voltaphone does not interfere with the use of the line for other services, and if several instruments are used on the same telephone line they can be arranged with a system of polarized relays and any sub-station can be called up as desired. The instrument is fitted with either a gramophone disk, which gives the reading in words, or with a signaling disk, which gives the readings in dots and dashes.

Bulletin L-509 describes a new line of air compressors of the Laidlaw-Dunn-Gordon Company, New York City. These compressors are fitted with Meyer steam-valve gears, permitting an adjustable cut-off. The air ends are arranged both with poppet inlet and outlet valves and with mechanically operated inlet and poppet outlet valves, the valves in either case being placed in the head of the cylinder, permitting the body to be effectively water-jacketed. The frames of the compressors are specially heavy. The capacities listed range from 468 to 2,220 cu. ft. of free air per minute, and the air pressures from 80 to 100 lbs. per sq. in.

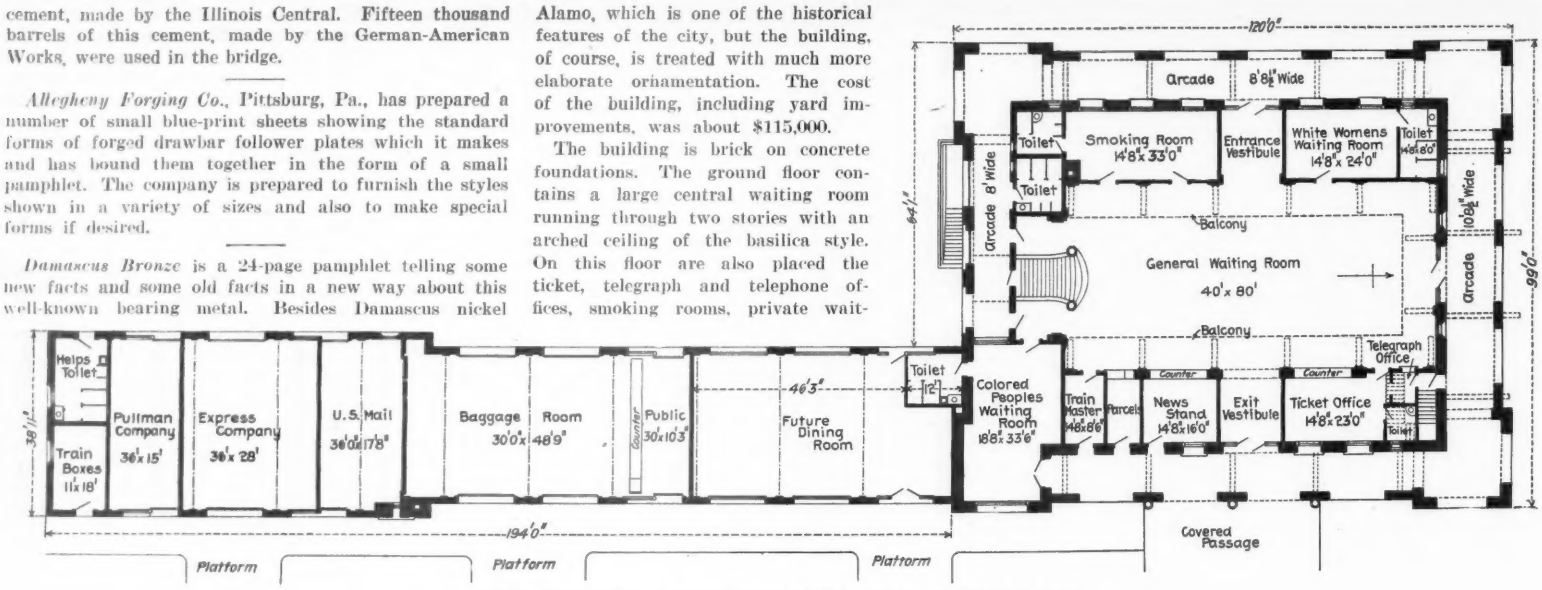
The German-American Portland Cement Works, Chicago, has issued an album of progress views of the Big Muddy concrete bridge of the Illinois Central. There are 40 half-tone engravings from photographs, beginning with the old steel structure that was replaced and ending with several views of the completed concrete bridge. There are also some figures from tests of "Owl" Portland

cement, made by the Illinois Central. Fifteen thousand barrels of this cement, made by the German-American Works, were used in the bridge.

Allegheny Forging Co., Pittsburg, Pa., has prepared a number of small blue-print sheets showing the standard forms of forged drawbar follower plates which it makes and has bound them together in the form of a small pamphlet. The company is prepared to furnish the styles shown in a variety of sizes and also to make special forms if desired.

Damascus Bronze is a 24-page pamphlet telling some new facts and some old facts in a new way about this well-known bearing metal. Besides Damascus nickel and phosphor bronzes space is given to Damascus "Hydraulic" metal, phosphorized tin, phosphorized copper and the different grades of Damascus babbitt metals. The illustrations are pleasing and the appearance of the book attractive.

The St. Louis Expanded Metal Fireproofing Company issues a circular giving a list of the buyers of its corrugated steel bars for reinforced concrete construction. The structures in which these bars are used include bridges, abutments, culverts, floors, footings, retaining walls, tunnels, subways and sewers as well as a variety of miscellaneous work. The names of users include the United States Government, and many of the larger railroads and well-known engineering concerns.



First Floor Plan of San Antonio Station of the Southern Pacific.

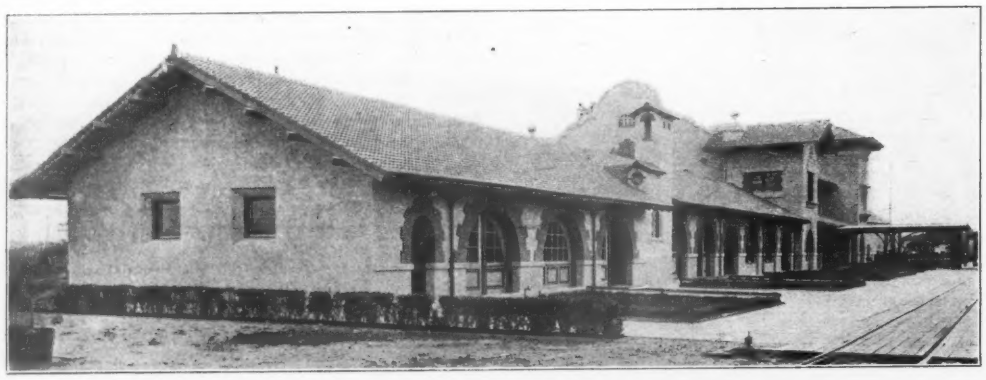
Southern Pacific Passenger Station at San Antonio.

The Southern Pacific has recently built at San Antonio, Texas, a new passenger station which is worthy of note as being a good recent adaptation of the Mission style of architecture. The keynote of the building is the Alamo, which is one of the historical features of the city, but the building, of course, is treated with much more elaborate ornamentation. The cost of the building, including yard improvements, was about $115,000.

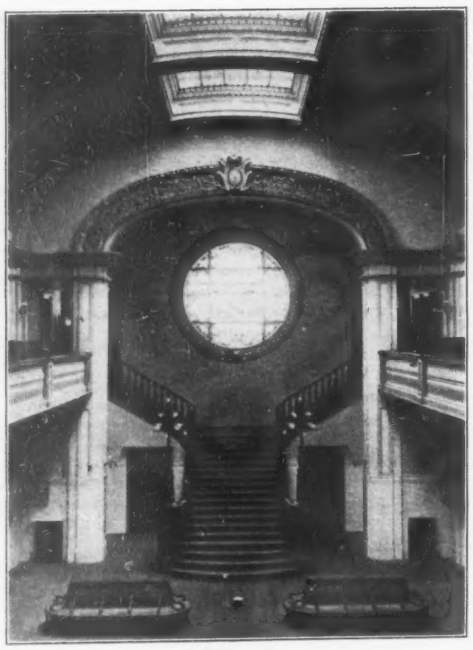
The building is brick on concrete foundations. The ground floor contains a large central waiting room running through two stories with an arched ceiling of the basilica style. On this floor are also placed the ticket, telegraph and telephone offices, smoking rooms, private waiting room, retiring room for ladies and the waiting room for colored people. On the upper floor are the division offices; on one side, the office of the superintendent, dispatchers, clerks and other operating officials; on the opposite side, the offices of resident engineer, draughtsmen, assistants, and conductors' rooms. The second story is reached by a stairway in the south end of the main waiting room, which leads to a gallery, running entirely around the main building, except across the south gable. There is also a private stairway in the northeast corner of the building for the use of officials. In the wing or one-story annex are the dining room, serving room, besides offices of Wells, Fargo & Co., United States mail, the Pullman Company and the baggage rooms.

The first floor is shaded by an arcade passing entirely around the main building. This arcade, which is omitted from the second floor, in order to give plenty of light to the offices above, is built so as to show heavy, rough hewn rafters and beams. The openings into the main waiting room are arranged opposite to each other on

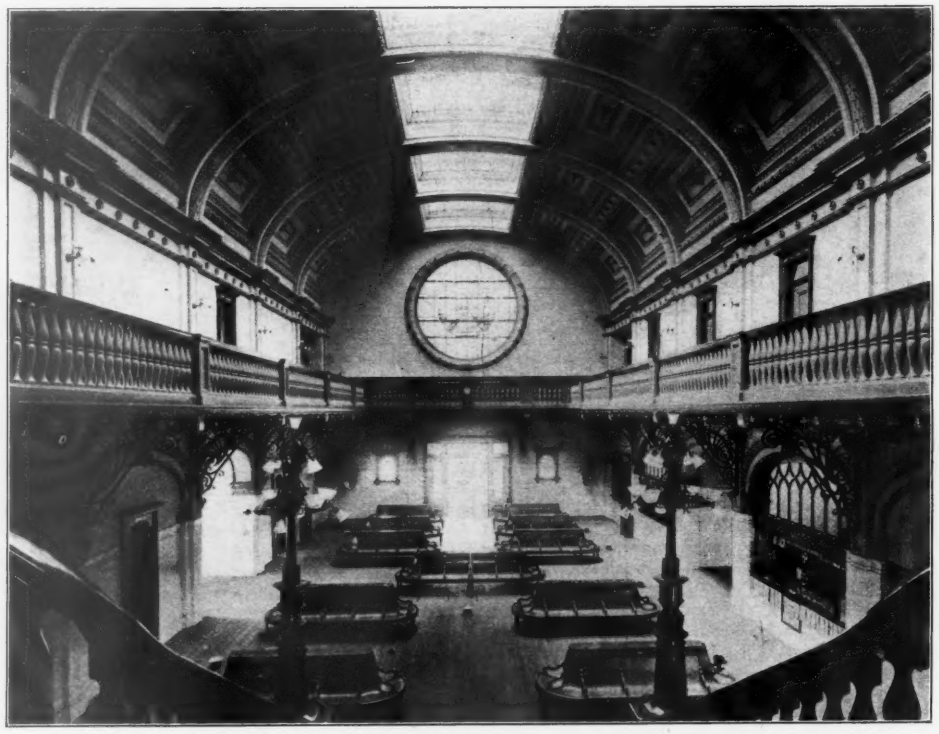
Looking South—Southern Pacific Station at San Antonio.



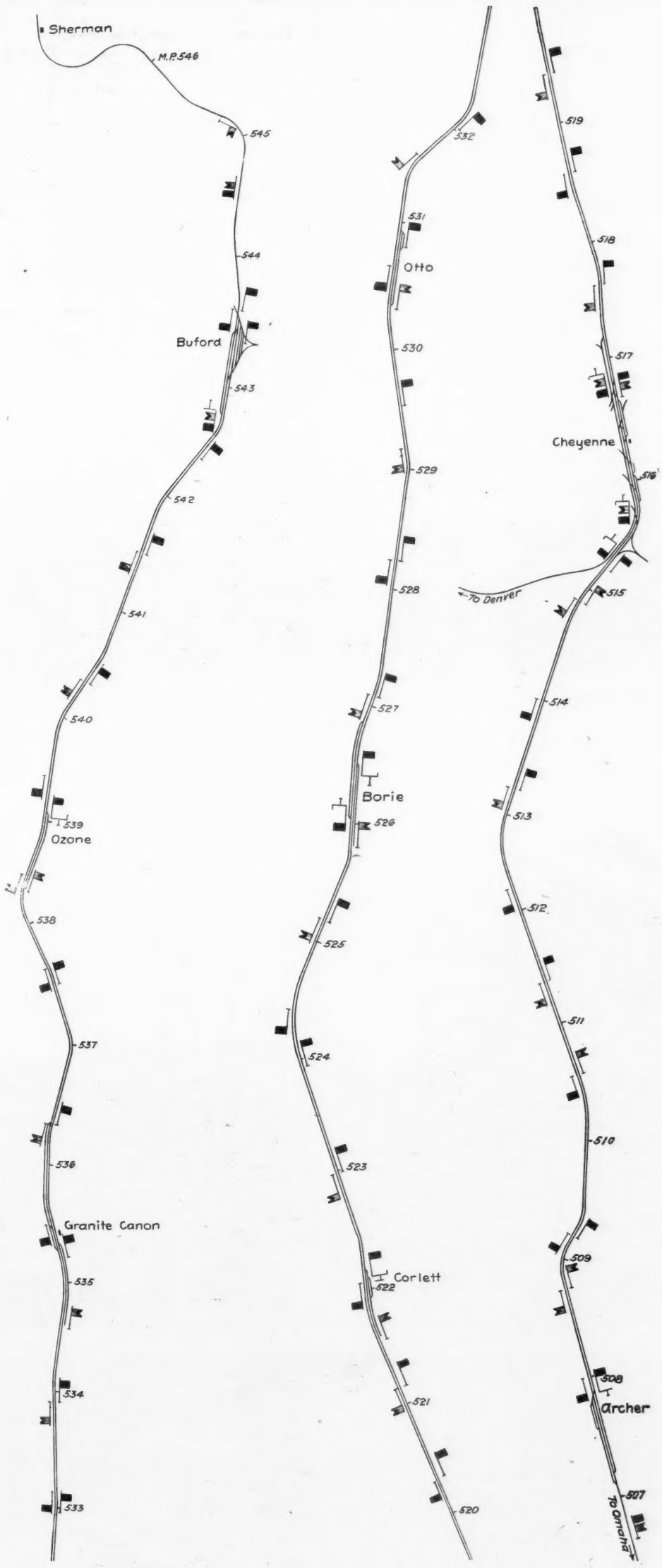
Looking North—Southern Pacific Station at San Antonio.



Stairway at South End of San Antonio Station.



Interior of San Antonio Station—Looking North.



Hall Electro-Gas Automatic Block-Signals on the Union Pacific Between Archer and Buford, Wyoming.

four sides of the building, so that in warm weather they may be thrown open to catch the breeze from any direction. In the main gables, which are at each end of the main waiting room, there are two beautiful stained glass rose windows, the one in the north gable showing the medallion of the Sunset Route, and the one in the opposite, or south gable, the coat of arms of the State of Texas. Other windows are glazed with bevel plate and fancy glass. The skylight over the main waiting room is of Etruscan glass.

The waiting room has a high wainscot of cream white tile; above this the finish is ornamental plaster. The exterior arches and jambs of the building are red brick, natural color, while the exterior walls are covered with a yellow stucco. The roof trusses of the main waiting room are steel. The entire roof is covered with red clay Spanish tile. The exterior ornaments are manu stone, artistically modeled. The exterior woodwork is painted in greens, browns and reds. The general tone of the interior decorations is ecru, light brown and gold gilt, which, with the great number of incandescent electric lights distributed on arches, panels and other available points, give a brilliant effect. All the gas and electric fixtures were especially designed and made for this structure.

The building is provided with a low pressure steam heating plant. Umbrella sheds were adopted for shade and shelter along and between the tracks in preference to an inclosed shed, so as to avoid smoke and noises incident to a complete inclosure. The grounds are being fitted up and when completed will be covered with lawns, flowers, palms and ornamental shrubbery.

The depot was designed by J. D. Isaacs and Assistant Architect D. J. Patterson, assisted by W. E. Milwain, all of the Southern Pacific Company, San Francisco. The work was carried on under the supervision of E. B. Cushing, Engineer Maintenance of Way of the Galveston, Harrisburg and San Antonio, assisted by H. F. Jonas; W. B. Sheldon being superintendent of construction.

Hall Electro-Gas Normal Danger Signals on the Union Pacific.

The Union Pacific Railroad is installing upon its 34 miles of double track, lately placed in service between Archer and Buford, Wyoming, an automatic electro-gas semaphore track circuit system of normal danger block signals, comprising 56 home signals and 30 distant signals. About one mile of this territory, coming within Cheyenne yard, is not to be signaled because of the great amount of switching done there, as, it was thought, to do so would greatly retard the switching and movement of trains through the yard. Nearly two miles of the single track at each end of double track are to be included in the installation. Westbound trains enter and leave the new second track through crossovers, the new second track being extended for a passing siding at each end.

The following description is a good example of thorough specification. The crossovers, worked manually, are electrically locked, and thus are fully protected. The specifications for the wiring, for the boxes, for track relays and for the ground connections for lightning arresters are particularly complete. The plans for switches require the signal circuits to be looped through normally closed springs in each switch instrument, and the track circuit to be shunted through normally open springs. The use of both the break and shunt might be criticized as being over-protection. The use of an overlap section for a home signal provided with a distant signal may be open to criticism by some as tending to produce lax discipline, but the officers of the Union Pacific find in the steep grades and other conditions at this locality what they deem adequate reasons justifying the practice.

It is proposed to connect each crossover at end of double track to a two-lever dwarf interlocking machine located in the telegraph office, and to so arrange the signal circuits that the signal for any route approaching the end of double track cannot indicate proceed until the crossover is properly set and locked. Electric locking is to be used on the interlocking machine so that it will be impossible to move the crossover while trains are passing over either switch, or to move it from its proper position for trains approaching from single track after the signals have indicated proceed.

Between Archer and Cheyenne there are both ascending and descending grades, the maximum being .7 of one per cent. From Cheyenne to Buford the grade is generally ascending, the maximum being 1.55 per cent. On the up grade, home signals only, with overlap, are used, except for those blocks in which are passing sidings where the overlap is discarded and a distant signal is provided to regulate the approach to the home signal. On the down grade, there is a home and a distant signal for each block, and each block overlaps into the next, excepting those in which there are passing sidings.

Each distant signal is located with the design of affording room for stopping the fastest trains between it and its home signal. A home signal is located about 500 ft. in the rear of the outbound switch of each passing siding so that should the switch be in use or set wrong, a train on the main line could proceed as far as the signal before getting a stop indication, but, in such a case, it would have received an indication from the distant signal in the rear as to the condition of the block. Visual indicators of the semaphore pattern, enclosed in iron boxes mounted upon iron posts, are to be used at all switches within the territory to be signaled.

In making the survey for the installation, the expedit-

ing and safe movement of traffic, grades, curves, switches, passing sidings, stations, etc., were carefully considered, so that each signal and piece of apparatus is located as nearly as possible where it properly belongs.

Besides the foregoing the specifications contain the following: The arrangement of circuits is such that a distant signal cannot indicate proceed until after its home signal has done so. The circuit of each home signal is carried through a circuit breaker on each switch within the block, and, in addition, the movement of each switch from its normal position shunts the track circuit. All sidings are to be bonded to the fouling point to form part of the block system and the outside rail is to be wired in series with the main track circuit.

Wires from tracks to poles are laid in fir trunking supported on stakes made from old boiler tubes. Signal and indicator wires carried in trunking are No. 14 B. & S. gage copper with $^{5}/_{32}$ in. okonite insulation covered with one braid. Common wire in trunking is No. 12 B. & S. gage copper with $^{6}/_{32}$ in. okonite insulation covered with one braid. Wire for track circuit connections is No. 8 B. & S. gage copper with $^{6}/_{32}$ in. okonite insulation covered with one braid. The wire for pole line circuits is required to meet the following specifications: All overhead or pole line wires for signals and indicators must be No. 9 B. & S. gage bare hard drawn copper having the following diameter in mils: Required, 114; minimum, 112; maximum, 118. The weight per mile required is 208 lbs.; minimum, 203 lbs.; maximum, 218 lbs. The breaking weights must be: Per square inch, 60,200 lbs.; actual minimum, 590 lbs. Twists in six inches, 32. Conductivity required, 97; minimum, 96.

Common wires on the pole line must be No. 8 B. & S. gage hard drawn copper with weather proof insulation two braids. Wire must be in long lengths with uniform insulation having a hard smooth finish, presenting the least possible chance for adherence of snow and ice. Outside diameter over insulation must be at least ¼ in. Weights per mile: Required, 349 lbs.; minimum, 330 lbs.; maximum, 360 lbs. The wire when bared of insulation must be as follows: Diameter, required, 128; minimum, 125; maximum, 131. Weights per mile: Required, 262; minimum, 256; maximum, 268. Breaking weights: Per square inch, 60,200 lbs.; actual minimum, 770 lbs. Conductivity: Required, 97; minimum, 96. Twists in six inches, 31. All joints in line wire are to be made with McIntyre connectors. Taps to line wire are to be fastened to dead ends specially arranged for that purpose. Signals are to be equipped with Union Pacific standard lamps and 75 deg. "continuous-light" spectacle castings.

Counters are to be provided in the mechanism cases and attached to the vertical rods of all signals, with a view to registering at all times the number of movements made by each signal so as to check not only the supply of gas, but the working of the signal as well.

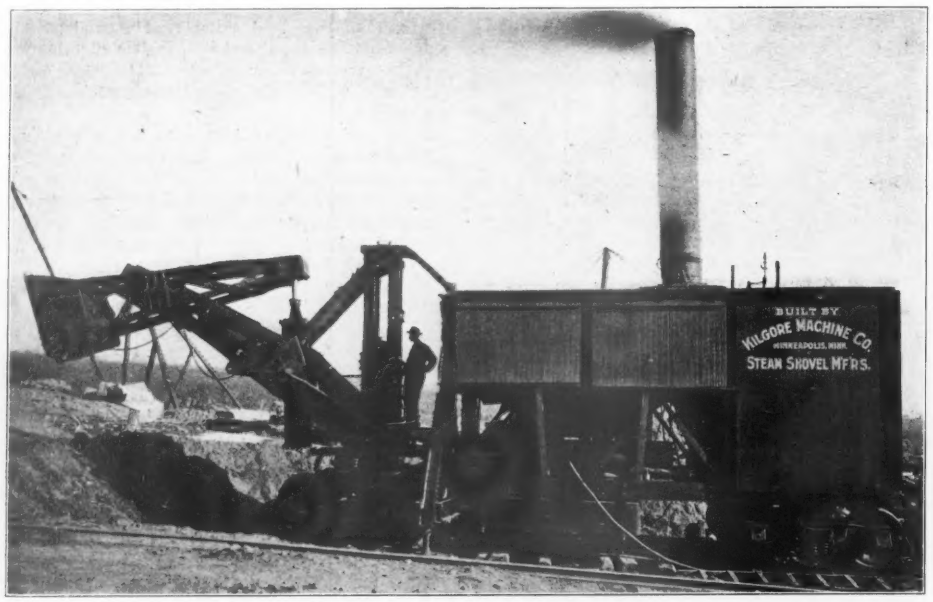
All batteries are of the gravity type. Signal and indicator batteries are to be housed in Union Pacific standard battery wells. These wells are similar to the ordinary wooden type with the exception that the mouth of the well has a long neck so that when set in the ground the top of the well is covered with 4 in. of earth. This is necessary because batteries placed in wells having an exposed top, will usually freeze if the temperature drops to 10 deg. below zero. As a preservative, the outside of the well is heavily coated with a mixture of roofing pitch, coal tar and ground asbestos.

Track relays are of the four-ohm glass-enclosed type. Those not housed in mechanism cases of signals are to be enclosed in moisture and dust proof double boxes, which consist of a wooden box built inside an iron box with an air space between the two, and mounted upon iron posts.

Choke coil lightning arresters with toothed ground plates are to be provided for all exposed circuits. The ground is made by burying in the earth in a suitable location a copper plate 1 ft. sq. embedded in charcoal and connected to the lightning arrester by a No. 8 copper wire.

The Kilgore Direct-Acting Steam Shovel.

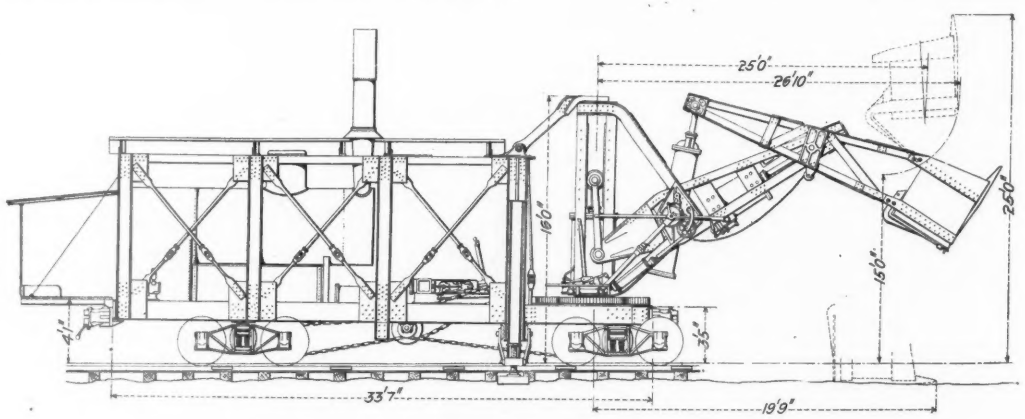
The engraving shows a novel form of steam shovel in which each moving part is controlled by a direct-acting steam cylinder, eliminating chains, sheaves, etc. The mast, boom and dipper-arm are all of box-frame construction, the material being steel. The mast is built of heavy-section members and contains the main lifting cylinder, which is connected to the inner end of, and controls the movements of, the oscillating boom. This boom is fulcrumed near its middle and has within it the cylinder controlling the movement of the dipper-arm parallel to the longitudinal axis of the boom. The dipper-arm



1¼-Yard Kilgore Direct-Acting Railroad Shovel.

spreads out at the dipper end to take hold of each corner of the latter, providing a rigid and substantial connection. The piston rod of an oscillating cylinder swung within the boom is connected to the opposite end of the arm. The boom is swung laterally by a cylinder on the floor of the car, the piston rod of which has on it a steel rack engaging a steel gear at the base of the mast.

All cylinders are cushioned at both ends, permitting them to be worked full stroke at high speed; they may be worked independently or together. The valves controlling the cylinders are light in pattern and are balanced, making them easy of operation. The levers are conveniently placed for the operator so that the machine may be worked with great rapidity and yet without fatigue to him. The movements of the controlling levers operated by hand are in the direction of the resulting motion of the dipper, simplifying the handling of the machine. Other controlling levers are moved by the foot of the operator. The machine is self-propelling.



Kilgore 2½-Yard Direct-Acting Railroad Steam Shovel.

The car body of the 1¼-yd. shovel is 26½ ft. long and 9½ ft. wide, and is built of I-beams and channels. It is mounted on 70,000-lb. all-steel trucks. Steam is supplied at 150 lbs. pressure by a locomotive-type boiler 50 in. in diameter and 12 ft. long. The car is propelled by a 6¾-in. x 12-in. double-cylinder engine. All motions of the dipper can be reversed with equal power. It can be moved forward or back by the forcing cylinder, enabling the dipper to be withdrawn from the bank when full without going through to the top. If the front truck of the car should get off of the track, the dipper can be lowered to the ground and the lifting and forcing cylinders used to raise and swing the car back onto the rails.

For a dipper capacity of 1¼ cu. yds. the machine entire weighs 30 tons and the 2½-yd. machine weighs 65 tons. These shovels give good results in ditching and irrigating. One was used in draining Hayward Marsh, near Albert Lea, Minn., the soil of which is black loam to a depth of 4 ft., overlaying a bed of gumbo clay, with an occasional strata of gravel. It is so soft that it will not support a horse and in order to carry coal to the shovel a road of hay was built. The sticky character of the soil causes it to adhere to hand shovels and to scrapers, so that they cannot be used; but as a consequence of the peculiar construction of this shovel by which the cylinders may be made to act with sufficient rapidity to shake the dipper violently, no difficulty was experienced in dumping the loads. The work in this marsh consisted of excavating a 13-ft. wide ditch, several miles long. It is claimed that one of these shovels ditching in dry soil will handle six to eight dipper loads a minute, dumping at 30 ft. The Kilgore Machine Company, Minneapolis, Minn., is the maker.

TECHNICAL.

Manufacturing and Business.

H. W. Toothe, for some time past manager of the railroad department of the Magnolia Metal Co., has resigned.

The Independent Railroad Supply Company, Chicago, has shipped a carload of Wohlhaupter rail joints to the Illinois Central.

The Missouri Steel & Iron Co., of Kansas City, Mo., has been incorporated with a capital of $50,000. F. E. Wear, Francis C. Downey and others are incorporators.

The Carroll Oilless Bearing Co., of Worcester, Mass., has been incorporated with a capital of $300,000 to make and sell all kinds of machinery. Wm. T. Carroll, John L. Truax and others, of Worcester, are incorporators.

The Fitz-Hugh, Luther Co. has bought the plant of the United States Locomotive Corporation at Hammond, Ind. New machinery will be put in and important improvements made. It is expected to have the shops in operation within a month.

The Samuel Smith & Son Company, of Paterson, has been incorporated in New Jersey with a capital of $100,000 to make iron, steel, coke, manganese, copper, and deal in lumber. Samuel Smith, Henry F. Bell and others are incorporators.

Allan F. McIntyre, structural steel, railroad and contractors supplies, 510 Monadnock Block, Chicago, has been appointed Western Agent for the John Eichleay, Jr., Company, Pittsburg, maker of structural steel and iron work for all purposes.

Mayer Brothers, Inc., is the name of a new company of Mankato, Minn., organized with a capital stock of $100,000 to make trip hammers, boilers, gasoline, and steam engines and structural iron and steel. Louis Mayer is President, and Lorenz L. Mayer, Secretary and Treasurer.

John H. Pierce, President of the Western Tube Company, Kewanee, Ill., has been elected President of the Illinois Manufacturers' Association. From 1890 to 1895 Mr. Pierce was Manager of the National Tube Company at Pittsburg. He later started the Western Tube Company, which now employs 3,500 men.

The Railway & Electric Equipment Co., capital $1,000,000, organized to sell cars and locomotives for steam and electric railroads, has filed articles of incorporation at Augusta, Me. Elwood C. Jackson, of Philadelphia; Charles C. Rolston, Chicago; Frank J. Lewis, Cleveland; Charles C. John and Robert W. Day, Buffalo, are the incorporators.

The Directors of the Illinois Bridge & Machine Co., of Jacksonville, Ill., appointed Nelson McMurphy, of Springfield, and Edgar E. Crabtree members of the Board, to fill vacancies caused by the resignation of John R. Robertson and Arthur H. Rankin. The company expects to add new machinery to increase its capacity next spring.

The One-Rail Traction Company of New York has been incorporated in New Jersey with a capital stock of $125,000 by Louis J. Somerville, Brooklyn; Henry J. Stoesser, Jersey City, and Alfred H. Willmont, Brooklyn, to buy and sell patent rights for the auto-balancing system of one-rail railroads conceived by William H Boyes and Erwin F. von Wilmowsky.

The Henderson Car Works Company has organized with a capital of $1,000,000. Shops will be built at Henderson, Ky. Chicago and Cincinnati capitalists, also a

number of local capitalists, are interested. The stockholders have elected officers as follows: President, James E. Rankin; Vice-President, James R. Barret; Treasurer, B. G. Witt; Secretary, R. H. Mehard, Chicago; General Manager, A. L. Jacobs, Cincinnati. The directors and officers of the company will shortly hold another meeting to select a site for the shops.

Iron and Steel.

It is reported that Geo. E. McCagne, Traffic Manager of the Carnegie Company of Pittsburg, will terminate his connection with the corporation Jan. 1.

The Pennsylvania Steel Company, Steelton, Pa., has orders for about 8,000 tons of rails for a new trolley line, financed by Pittsburg, Pa., capital, to be built in Mexico City, Mexico. The company has recently reduced its force at Steelton by the laying off of nearly 50 men.

The McClintic-Marshall Construction Company, with works at Pittsburg and Pottstown, Pa., builders of steel buildings, bridges, etc., has contracts for putting in a new bar mill for the Lackawanna Steel Company of Buffalo, N. Y., which will require about 575 tons of structural steel. Also for a large steel building for the Ward-Dickey Steel Company, at Indiana Harbor, Ind.; a bridge for the Pittsburg & Lake Erie Railroad, at Lowellville Junction, and other work aggregating several thousand tons.

A committee consisting of James A. Blair, Wm. L. Bull and others has been appointed by the Colorado Fuel & Iron Company to perfect the reorganization of the company. The company has stated to the stockholders its plan to raise $13,600,000 by means of an increase of $6,200,000 in the company's capital stock and an issue of 5 per cent. gold bonds for the remainder, the money to be used to buy back properties recently sold by the company, and for a working capital. The bonds would be secured by a mortgage on all the property of the company.

Canadian railroads are now ordering steel rails for next year's delivery. It is announced that agents of the United States Steel Corporation have recently secured orders in Canada for over 120,000 tons. The financial troubles of the Consolidated Lake Superior Co. and the set-backs experienced by the Dominion Steel Co. will prevent them from turning out many steel rails for next year's trade, and practically the whole of the Canadian requirements of 1904 will have to be satisfied by the United States Steel Corporation. It is expected that railroad building will be quite active in Canada during the ensuing year.

Improvements in Michigan Lubricators.

The Michigan Lubricator Company, Detroit, Mich., has made a number of improvements in its sight-feed locomotive lubricator. Most important is an automatic safety device over the sight-feed glasses to prevent injury to the men in the cab from escaping steam and oil if a glass breaks. Other improvements include by-pass valves and a check ball in the top of each sight-feed arm and in the water tube. By the use of a valve and the check ball in the top of a sight-feed arm, a broken glass in that arm can be renewed without shutting off the other feeds, or connections, or the throttle. The check ball in the water tube prevents the siphoning of the water out of the lubricator reservoir.

Master Car Builders' Circulars of Inquiry.

The committee appointed to report on the best preventive of rust on steel cars has sent out a list of 14 questions, from the answers to which it hopes to make a recommendation at the next convention, covering the kind and quality of protective paint, the method of applying it on new and old cars, and the means to be employed in preventing corrosion of cars or particular members of cars in exceptionally severe service. Replies should be addressed to H. S. Hayward, S. M. P., Pennsylvania Railroad, Jersey City, N. J., who is chairman. The committee on coupling chains has also sent out a circular containing 10 questions covering the practice of permanent safety coupling chains and emergency coupling chains. The chairman is R. P. C. Sanderson, S. M. P., Seaboard Air Line, Portsmouth, Va., to whom replies should be sent.

Route-Levers in Power Interlocking.

An interesting new development of power signalling is to be carried out in connection with the installation of low-pressure pneumatic apparatus at Ermont Junction on the Northern Railroad of France, by the British Pneumatic Signal Co. This junction, which is within a short distance of Paris, is in the shape of a two-pronged fork, the stem of which leads to Paris, whilst one prong goes towards Pontoise and the other towards Valmondoise, all three lines being double tracks. There are also several sidings requiring to be worked from the junction cabin. To simplify the work of the signalmen it has been decided to use "route-levers," and each combination of switches forming a cross-road will be worked by a single lever, while another single lever operates all the signals in each direction, these signals being "selected" on the ground through the switches. Thus, instead of having to pull over a number of levers in series in order to pass a train from one side of the junction to the other, the signalman will only have to pull two levers, one of which will work the whole combination of switches necessary to be moved, while the other is a master lever for the whole of the signals for that route. In the case of the sidings the principle of the route-lever is to be carried a step further and both the signal and the switch operated by one stroke of the lever. The route-lever arrangement already exists in essence at the Salisbury and Staines installations on the London & South Western. The mechanism employed is simply a variation of the "automatic return." Instead of coming back at once to the cabin to complete the stroke of the lever and release the interlocking, the return air from the operating chamber is conveyed to the second set of switches, which it operates in the usual way, and thence the return air comes back to the cabin to give automatic indication to the signalman that the route is properly set up. In the matter of piping there will probably be a saving over the ordinary method of operating by separate levers, but—paradoxical though it may seem—a larger number of levers will be required than would be wanted with the ordinary practice, as each combination of switches will require a separate lever. The installation at Ermont will have a 44-lever frame, and it is understood that, if it is satisfactory, the low-pressure apparatus will be used on other parts of the Northern, the officers of which have expressed their intention to adopt power signaling in future for all installations of over 40 levers.

THE SCRAP HEAP.

Notes.

Newspapers on the Pacific coast say that the Northern Pacific will, on January 1, adopt Brown's discipline, doing away with suspension of employees for misconduct and negligence.

The appeal of the railroads in the suit of the State of Minnesota to annul the Northern Securities Company was argued before the Supreme Court of the United States this week.

Representative Cooper, of Wisconsin, in the House, and Mr. Quarles, in the Senate, have introduced bills in Congress to strengthen the powers of the Interstate Commerce Commission. These bills contain provisions similar to those of the bill introduced early in 1902 empowering the Commission to prescribe rates for the future in cases where its investigations showed existing rates to be too high.

It is reported that the Pennsylvania Railroad during the past few weeks has re-engaged several hundred men in its train and yard service, who were dismissed in the autumn on account of the falling off in business, and the shops at Altoona are now running on full time. The newspapers both in the East and the West agree in reporting the railroads as now receiving a much better volume of freight than a month ago.

Bourbon Stock Yards Company.

The Bourbon Stock Yards Company is just finishing extensive new stock yards, covering about 12 acres, at Louisville, Ky., at a cost of about $200,000. The sheds are one story. Every pen has a flow of fresh water, is well ventilated and lighted, and the yards accommodate 5,000 head of cattle a day. The hog houses are three stories, with accommodation for 20,000 head, and the sheep pens are two-story buildings and have accommodations for 20,000 head.

Consolidation of Rock Island and Frisco Agencies.

Arrangements have been made to consolidate many of the agencies of the Rock Island and the St. Louis & San Francisco railroads on January 1. A. H. Moffat, General Eastern Passenger Agent of the Chicago, Rock Island & Pacific, and F. D. Russell, General Eastern Freight Agent of the St. Louis & San Francisco, will act jointly for the Rock Island-'Frisco system in New York. The commercial agents in Boston, Philadelphia and Buffalo will represent both companies. The St. L. & S. F. offices at Omaha, Los Angeles and San Francisco are to be closed. H. F. Needham, commercial agent of the St. L. & S. F., in San Francisco, will be transferred to the Rock Island office in that city.

South Atlantic Car & Manufacturing Company.

The first annual meeting of this company was held Dec. 8 at Way Cross, Ga. The report of General Manager McGee for the first three months' operation was most satisfactory to the stockholders, who authorized a quarterly dividend of 4 per cent., and reserved a considerable surplus. The officers elected were the same as before, with the exception of Secretary Burnett, who resigned on account of ill health. They are Geo. Dole Wadley, President; W. A. Price, Vice-President; F. H. McGee, Second Vice-President, and Wm. G. Raoul, Secretary and Treasurer. Messrs. Geo. W. Deen, C. M. Sweat and J. E. Wadley were elected directors in the place of L. Johnson, J. S. Bailey and J. M. Cox, who had disposed of their interests. The company has made 320 box cars for the Mexican National and has 180 more to make to finish that road's first order. It also has 300 flat cars to build for the Atlantic & Birmingham, with other orders uncompleted. The factory builds six and seven box cars a day of 80,000 lbs. capacity and employs about 200 men.

Government Estimate of the Cotton Crop.

The Agricultural Department estimate of the total cotton crop of the United States for the present season, given out December 3, predicts a yield of 9,962,039 bales of an average weight of 490.8 lbs. The Bureau of Statistics roughly estimates that this is equivalent to 10,250,000 commercial bales. The figures are lower than was generally expected and their publication at the Cotton Exchange in New York almost created a panic. The sales for the first time in the history of the Exchange exceeded the 2,000,000 bale mark, according to an estimate of the aggregate transactions, no official record being kept of transactions by the Exchange. Futures closed at a net advance ranging from 72 to 78 points. It is quite generally believed, in view of subsequent disclosures, that there was a leak somewhere from which information was received early by certain parties, and the Secretary of Agriculture has received severe criticism for permitting this to be possible in his department.

Shipping Committee on Immigration Laws.

The committee on shipping of the New York Chamber of Commerce has submitted a preliminary report opposing recent efforts to have more severe immigration laws enacted. The committee is composed of A. F. Higgins, W. P. Clyde, S. W. Carey, H. F. Dimock, J. A. Wright, Jr., William Coverly and Jefferson Hogan. The committee does not agree with the contention made by resolutions previously offered to the Chamber of Commerce that the enormous immigration which has flowed to this country within recent years has been attended with the lowering of the moral and physical standing of the immigrants. The report describes the care taken by the regular steamship lines to the United States ports to prevent bringing immigrants who are not entitled to land, and calls attention to the fact that immigrants are greatly desired in certain sections of the country at the present time. For example, it has been almost impossible to get labor to harvest the crops in the Northwest. The committee believes that naturalization laws can be made more strict and that immigration is affected by the contract labor laws, while any legislation that will decrease immigration is favored by the Federation of Labor, Knights of Labor, and the labor unions, which are perhaps the principal forces that influence our legislators toward more restrictive legislation. The committee closes its report with a letter from Mr. Wright of the American Line, pointing out the follies and fallacies of some of the restrictive measures which have been talked of.

Trouble in the Mountains.

The twentieth anniversary of the opening of the Arlberg Tunnel was celebrated with much ceremony recently, among those present being many of those engaged on the construction of the tunnel. The Austrian Minister of Railroads, Dr. von Wittek, was present, and with him his sister, Miss Irma von Wittek. At the dinner concluding the celebration, in reply to the toast to the ladies, Miss von Wittek read a poem, which "brought down the house." A remote idea of it may be formed from the following, for the understanding of which it is necessary to remember that work is now going on in the Austrian Alps on great tunnels under the mountains named: Bosruck, Kolba, Hanenkogel and Tauernmogel.

The sky with stars was all aglow,
(It was but a short time ago)
When on a bare and breezy height,
The mountain spirits met one night.
In truth they were a jolly crowd.
At Alpine tourists they laughed loud.
But four (each from a mighty peak)
Sighed only, and no word would speak:
From Bosruck, Kolba, Hahnenkogel,
And from the giant Tauernmogel,
At last they crept to Arlberg slyly
And to the old man whispered shyly:
"We have to tell you something awful;
We don't believe it can be lawful;
Deep in our bowels there's an aching;
No rest by day or night we're taking.
A reckless lot of men now fill them,
And with their noisy engines drill them.
The rascals really seem to have fears
Neither of rocks nor melting glaciers.
Old man, we think you'll not deride us
For asking who these are inside us;
And what to do to cure the colic
They cause us by their heedless frolic."
"My sons," said Arlberg, "it appears
Your troubles with the engineers—
Microbes that tortured me for years.
And the advice I now give to you
Is, let them work till they get through you,
For in the eighties, long ago,
I found those fellows *won't* let go."

Blankets, Boot-Heels and Chocolate.

The Interstate Commerce Commission, in an opinion by Commissioner Prouty, has announced a supplemental decision in the case of George J. Kindel and the Denver Chamber of Commerce against the Atchison, Topeka & Santa Fe, and others. The decision says that except as to 140 commodities, defendant complied with order of the Commission, directing that rates from the Pacific Coast should not be higher to Denver than to the Missouri River, and later pending further investigation, the number of articles insisted upon as constituting exceptions was reduced to 32. It was held by the Commission in its previous report that defendants were warranted in charging a higher rate to Denver than to the Missouri River on sugar carried from the Pacific Coast, and it is now further held that defendants are justified in maintaining rates from the Pacific Coast, which are lower to Missouri River points than to Denver upon rice, hemp, baking powder, blankets, books, boot and shoe heels, chocolate, cocoa and extracts, but that as to all of the other commodities mentioned in this report the rate from Pacific Coast points should not be higher to Denver than to points on the Mis-

souri River. As to traffic other than the excepted commodities herein mentioned, the general rule which has been laid down in this case, is that in the making of these trans-continental rates Denver must receive the same treatment that is accorded to cities in the Middle West and Missouri River territory. It has not been held that rates between New York and San Francisco in either direction must not be lower than at Denver, nor has the inherent reasonableness of the rates to Denver from any direction been considered.

Railroad Damage Suits in Texas.

An officer of the Southern Pacific has recently given out some facts concerning the outrageous situation in Texas where the practice of bringing damage suits against railroads has become a great abuse. Many suits are based on fraud. At the present time suits are pending against the Southern Pacific alone for alleged personal injuries for damages aggregating $6,000,000, or $2,000 a mile, an amount out of proportion to like actions against roads in other States. In one case a man was killed at 9 a.m. By 1 p.m. a suit was filed by the widow for heavy damages against the company, before any of its officials could with decency approach her to offer pecuniary compensation. On the Southern Pacific the damage suit awards for personal injuries in Texas amounted to $378,191 for the year 1902. This is said to be equal to 60 per cent. of the company's entire income in Texas from local passengers. During that year the amount sued for in Texas was $453,000, while on all the company's lines in New Mexico, Arizona, Colorado, Nevada, California, Oregon and Utah the suits amounted to only $118,000, and the sums awarded were considerably less.

Attitude of a New Railroad President.

C. S. Mellen, the new President of the New York, New Haven & Hartford, assured the members of the Chamber of Commerce at Providence last week, at a banquet, that the personality of the men in charge of the road had changed, and that efficient and satisfactory service would be given hereafter.

According to newspaper reports, Mr. Mellen said that he had been advised that Providence was the storm center of the system. "I am not going to discuss with you ancient history, for that can be productive of little good, but I am going to ask you to join with me in making history from this time on, urging you to remember that a railroad company is, for the time being, only the personality of the men in charge of its affairs, and when that personality changes, there can be only time lost in complaining of what has been, and progress can lie only in considering and encouraging that which should be.

"It is the man, and not the artificial being called the company, that has been at fault, if fault there has been. The men having gone—let the remembrance of your troubles go with them.

"You but handicap me in my efforts for improvement by distrust, doubt, and disparagement, while with a little encouragement now and then you can spur to renewed effort and bring the desired result nearer accomplishment.

"It is doubly incumbent upon the management of a railroad having practically a monopoly, as we have, to serve you faithfully and efficiently.

"You should not submit to unreasonable exactions, discourteous treatment, or insufficient and unsatisfactory accommodations. You are entitled to the best there is, and the company is able and willing to give it.

"You should, however, remember that it is not easy to control and discipline 35,000 employees. The stock of angels has run rather low, and the wages paid are not attracting them to the extent we would like, but with the material available we are proposing to do the best we can, and trust to make manifest a constant improvement.

"Earnestly desiring here the confidence that has been my reward in other fields of work, I am hopeful to have at your hands honest, carefully considered criticism, that may help toward the improvement we all so much desire, and assure you that it will be gratefully received and considered in the spirit it is given."

Mr. Mellen is reported as saying in a newspaper interview: "The large increase of freight business calls for much better facilities than now at most of the larger stations, and in particular, for rebuilding or strengthening of bridges in order that they may bear heavier train loads. This last improvement is of the utmost importance, will receive my immediate attention, and steps toward it have already been taken with full assent of the directors. Local complaints of inadequate sidings will also, if well founded, be immediately redressed. New fast passenger trains will be put on between New York and Boston. The running time between the two cities will not, however, be reduced below five hours. With the slowings at 11 drawbridges on the main line and three stops of five minutes each the actual full speed is now about 50 miles an hour and cannot safely be increased. Irregularities in the train service, of which I have found complaint, have been due largely to poor coal bought during the strike and often mixed with good coal. With that stock of coal used up, and with 110 new locomotives the service will soon become regular.

"Attention will be given before long to the better development of suburban business and a special examination has been ordered of the condition and returns of the electric lines of the company. In the case of the company's most costly improvement, that at Bridgeport, the first two elevated tracks will be in use by the middle of this month, the second two by July, and the whole improvement, including the large new station, will be finished about a year hence."

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular mettings of railroad associations and engineering societies see advertising page xvi.)

New York Railroad Club.

At the meeting of this club, to be held Dec. 18, a paper will be read by C. L. Bardo on "Design and Operation of Division and Tidewater Terminals."

American Society of Civil Engineers.

At the meeting held at New York, Wednesday, December 16, a paper by Emile Low, M. Am. Soc. C. E., entitled "The Breakwater at Buffalo, New York," was presented for discussion.

St. Louis Railway Club.

The December meeting was held Friday, the 11th, in the gymnasium of the Missouri Athletic Club. Mr. S. D. Webster, General Claim Agent of the Terminal Railroad Association of St. Louis, presented a paper on "The St. Louis Terminals, Retrospective and Suggestive." This being the Christmas meeting a programme of entertainment consisting of vaudeville numbers was given, and a lunch was served.

American Institute of Electrical Engineers.

At the meeting of this association, Dec. 18, in New York, the subject will be "Central Stations." Some of the papers are "Overhead High Tension Distributing Systems in Suburban Districts," by Geo. H. Lukes; "Automatic Apparatus for Regulating Generator and Feeder Potential," by E. J. Bechtel; "Safeguards and Regulations in the Operation of Overhead Distributing Systems," by W. C. L. Eglin; "Gas Power for Central Stations," by J. R. Bibbins.

PERSONAL.

—Mr. M. C. Jameson, Comptroller of the Norfolk & Western, died suddenly in Roanoke, Va., Dec. 11, at the age of 64 years.

—Mr. Robert Meek, Superintendent of the Chesapeake & Nashville, died at his home in Gallatin, Tenn., Dec. 10. He was a native of New York State and began his railroad work in 1848 as machinist on the Little Miami. Mr. Meek was for a time Master Mechanic on the Lawrenceburg & Upper Mississippi. For about four years he was Superintendent of the Memphis, Clarksville & Louisville, and in 1870 became Superintendent of the Louisville & Nashville. Then for eight years, from 1873, he was Superintendent on the South & North Alabama and in 1881 became General Superintendent of the Paducah & Elizabethtown. Mr. Meek had been with the Chesapeake & Nashville since 1885.

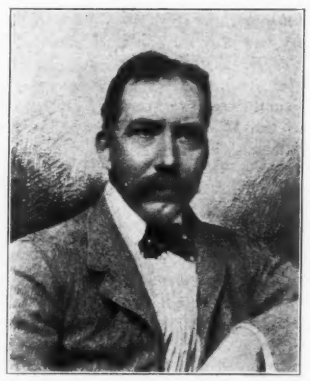
—Mr. Benjamin R. McKeen, who succeeds Mr. H. I. Miller as General Manager of the Vandalia Line (Terre Haute & Indianapolis), is a son of Mr. W. R. McKeen, who was for many years President of the road. With the exception of the short time that he has been Superintendent of the Chicago Terminal Division of the Pennsylvania Lines West of Pittsburg, Mr. McKeen's railroad service has been with the Vandalia. He was born in 1864 and graduated from Rose Polytechnic Institute, Terre Haute, Ind., in Civil Engineering in 1886. He began with the Terre Haute & Logansport division of the Vandalia as chainman, and advanced to Engineer of Maintenance of Way, from which he was promoted, in 1894, to be Superintendent of the Peoria Division. He succeeded Mr. Miller as Superintendent of the Main Line Division in 1901, when the latter became General Manager. He left the Vandalia in April, 1902, to take the position with the Pennsylvania at Chicago, which he now resigns to return to the Vandalia as its General Manager.

—Mr. T. S. Moise, the new General Superintendent of Transportation of the Central of Georgia, was born in New Orleans, 41 years ago. Mr. Moise began his railroad life on the Central, and has been in the service of the company for about 24 years. Starting in the agent's office at Montgomery as seal clerk he was promoted through various grades until 1891, when he was transferred to Macon as Trainmaster. The next year he became Superintendent of the South Carolina Division, and in June, 1892, went to the Savannah & Western Division at Columbus. In February the following year he was made Superintendent of the First Division at Savannah, from which position he is now promoted to that of General Superintendent of Transportation.

—Mr. F. S. Jette, whose promotion to be Assistant to the General Manager of the Central of Georgia is announced in another column, is 43 years old. His railroad service dates from 1879, when he began as a car sealer on the Vandalia Line at East St. Louis; and he remained with this company as clerk until December, 1881. For the following three years he was in the local freight office on the Louisville & Nashville at Nashville, and then for three years was rate clerk at Louisville. From 1887 to 1890 he was clerk in the general freight and passenger office of the Western of Alabama at Montgomery. Later he went to the Central of Georgia as chief clerk to the General Manager, from which position he is now promoted to that of Assistant to the General Manager. His office is at Savannah.

—Mr. J. Van Smith, for many years on the Baltimore & Ohio, died at his home in West 55th street, New York City, on Dec. 8. Born in Baltimore in 1850, Mr. Van Smith entered the service of the Baltimore & Ohio in the baggage department. In 1887 he became Superintendent of the Philadelphia Division, and later General Superintendent of the Trans-Ohio Division, with office at Chicago. The last years of his service for the company were as General Superintendent of the company's railroads and other interests at and around New York harbor.

—Mr. Harry Irving Miller, who takes the place of Mr. Goodnow as General Manager of the Chicago, Rock Island & Pacific, was born in Ohio 41 years ago, and is a graduate of Cornell University. He began his railroad career in 1880 as a clerk in the Superintendent's office of the Pennsylvania Company, and has been continuously on Pennsylvania Lines ever since. In 1882 he was made chief clerk, and a few months later became inspector of masonry, and then Assistant Engineer. He then became Engineer of Maintenance of Way, and was in April, 1888, assigned to special duties on the Cincinnati & Richmond, which was then building. The following September he was appointed Superintendent at Richmond, Ind., and in 1890 was transferred to Louisville, Ky., where he remained until 1894, when he took a similar position on the Vandalia at St. Louis. From this place he was promoted to be General Manager of the Vandalia, which company he now leaves to go to the Rock Island as General Manager. Mr. Miller is a Director of the Mechanics' National Bank of St. Louis, and also of the Louisiana Purchase Exposition. Mr. Miller is son of J. F. Miller, who for many years was General Superintendent of the Pennsylvania Lines, and who is now Vice-President of the Cleveland, Akron & Columbus.



—Mr. William M. Biddle, Secretary and Treasurer of the Cumberland Valley, died at his home in Carlisle, Pa., Dec. 9, at the age of 48. He was graduated from Dickinson College, class of '73, and had been Treasurer of the road since 1889.

—Mr. James H. Barrett, the newly appointed General Superintendent of the Buffalo, Rochester & Pittsburg, with office at Buffalo, was born in Ireland in 1847, and at the age of 14 entered the service of the Pittsburg, Fort Wayne & Chicago. At the age of 18 he was train despatcher and Assistant Superintendent on the Atlantic & Great Western, and in 1870 was Master of Transportation on the Pittsburg, Cincinnati & St. Louis. He has been on the Cincinnati, Hamilton & Dayton, the New York, Lake Erie & Western, the Ohio Southern and the Chicago & Alton; and also for a short time was General Superintendent of the road to which he now returns, the B., R. & P. He resigned his place on the Chicago & Alton about a month ago.

—Mr. W. L. Williamson, the new Superintendent of Terminals of the Southern Railway (St. Johns River Terminal Co.) at Jacksonville, Fla., has been in railroad service since 1877, beginning as a messenger boy on the Chesapeake & Ohio. He served in various capacities on that road until 1883, when he was made train despatcher at Charlottesville, Va. For a few months in 1885 he was with the Western Union Telegraph Company, but returned to railroading as despatcher on the Georgia Pacific. From 1894 to 1899 he was chief despatcher and trainmaster on the Florida Central & Peninsular at Savannah, and from the latter year until his new appointment was chief despatcher and trainmaster for the Southern at Columbia, S. C.

—Mr. Samuel R. Ainslie, for many years an officer of the Northern Pacific, and later on the Wisconsin Central and the Chicago Terminal, died at his home at Oak Park, Ill., on December 8, from tuberculosis, after a long illness. Mr. Ainslie was born at Sandusky, Ohio, in 1848, and began his railroad work as a clerk in the general freight office of the Sandusky, Dayton & Cincinnati. About 1869 he went to the Kansas Pacific and later was made Superintendent of that road. Subsequently he was General Superintendent of the Denver & Rio Grande. He resigned from this place to go to the Northern Pacific as Superintendent and was steadily promoted until he became Assistant General Manager. From there in 1889 he went to the Wisconsin Central as General Manager and later, in 1891, he became General Manager of the Chicago & Northern Pacific and the Chicago & Calumet Terminal, which were affiliated with the Wisconsin Central. When these lines were reorganized into the Chicago Terminal Transfer Railroad Mr. Ainslie was made President and General Manager. This position he held until he was compelled to retire on account of failing health about four years ago.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—M. L. Byers, hitherto Assistant to the General Manager, has been appointed Assistant General Superintendent of Transportation, with headquarters at Baltimore, Md. He will have charge of the loading, routing, transfer and movement of local and time freight, and such other duties as may be assigned to him by the General Superintendent of Transportation.

Central of Georgia.—F. S. Jette has been appointed Assistant to the General Manager, with headquarters at Savannah, Ga. T. S. Moise, hitherto Superintendent of First Division, becomes General Superintendent of Transportation, with office at Savannah, Ga.; J. T. Johnson, hitherto Superintendent of Fourth Division, becomes Superintendent of the First Division, with office at Savannah, Ga.; and H. B. Crawford becomes Superintendent of the Fourth Division, with office at Columbus, Ga., succeeding Mr. Johnson.

Chicago, Burlington & Quincy.—Robert Rice, hitherto Trainmaster, has been appointed Assistant Superintendent of the Galesburg Division, with headquarters at Galesburg, Ill.

Chicago, Rock Island & El Paso.—L. M. Allen has been appointed General Passenger Agent, with headquarters at Chicago.

Denver & Rio Grande.—A. S. Exter has been appointed Assistant Superintendent of the Third Division, with headquarters at Salida, Col., succeeding S. J. Hardy.

El Paso-Northeastern.—R. S. Sumner, Chief Engineer, having resigned that position has been abolished. G. C. Millet has been appointed Engineer of Maintenance of Way, with office at Alamogordo, N. Mex.

Georgia Northern.—The officers of this company are: President and General Manager, C. W. Pidcock; Vice-President and General Superintendent, F. R. Pidcock, and Secretary and Treasurer, G. E. Smith.

Great Northern.—George A. Bruce has been appointed General Master Mechanic of the Eastern District, with headquarters at St. Paul, Minn., succeeding T. Roope, resigned.

Louisiana & Arkansas.—Frank Cain having resigned the position of Master Mechanic, the office is abolished. F. A. Symouds has been appointed Foreman of Shops at Stampa, Ark.

Missouri, Kansas & Texas.—J. O. Whitmarsh has been appointed Superintendent of the Oklahoma Division, with headquarters at Oklahoma City, Okla. T.

Missouri Pacific.—A. H. Moll has been appointed Division Superintendent at Ossawatomie, Kan., succeeding W. E. Brooks.

Mobile, Jackson & Kansas City.—T. M. Downing, heretofore Master Mechanic of the St. Louis, Memphis & Southeastern, has been appointed Superintendent of Motive Power of the M., J. & K. C., with headquarters at Mobile, Ala.

National of Tehuantepec.—E. M. Wise, formerly Terminal Superintendent, has been appointed Traffic Superintendent, with headquarters at Rincon Antonio, Mex., succeeding W. R. Mansfield.

New Orleans Belt & Terminal.—The resignation of N. C. Carroll, General Freight Agent, has been withdrawn.

New York, New Haven & Hartford.—H. M. Kochersperger, Comptroller, has been elected Third Vice-President, succeeding William E. Barnett.

St. Louis & San Francisco.—H. H. Brown, hitherto Trainmaster, has been appointed Superintendent of the Western Division, with headquarters at Neodesha, Kan., succeeding J. A. Quinn. R. V. Miller, hitherto Superintendent at Fort Scott, has been appointed Assistant to the Vice-President and Assistant General Manager, with headquarters at St. Louis, Mo.

San Pedro, Los Angeles & Salt Lake.—R. W. Smith has been elected Secretary, with office at Los Angeles, Cal., succeeding T. F. Miller.

Southern Pacific.—E. A. Gilbert, Master Car Builder, at San Francisco, Cal., has resigned.

Spokane Falls & Northern.—The officers of this company are: President, L. W. Hill; Vice-President, H. A. Kennedy; Treasurer, E. Sawyer, and Secretary, A. M. Thomas.

LOCOMOTIVE BUILDING.

The Atlantic & Birmingham is having five locomotives built at the Baldwin Works.

The New York, Philadelphia & Norfolk has recently placed an order for three locomotives.

The Tionesta Valley is having one locomotive built at the Brooks Works of the American Locomotive Company.

CAR BUILDING.

The Chicago, St. Paul, Minneapolis & Omaha is having 100 freights built by Haskell & Barker.

The Wrightsville & Tennille is having 25 box cars and 35 flat cars built by the Georgia Car & Mfg. Co.

The New York, Ontario & Western is asking bids on four passenger coaches and two drawing room cars.

The Atlantic & Birmingham is having 400 flat cars built by the South Atlantic Car & Mfg. Co., Waycross, Ga.

The Chicago & North Western has ordered 300 refrigerator and 250 furniture cars from Haskell & Barker.

The Cleveland, Cincinnati, Chicago & St. Louis has ordered 35 coaches and five combination cars from the Pullman Co.

The St. Louis Southwestern is having 100 freights built at the Madison Works of the American Car & Foundry Co.

The Cincinnati, Hamilton & Dayton has ordered four 70 ft. combination smoking and baggage cars from Barney & Smith.

The New Orleans & Northeastern is having 100 freights built by the South Baltimore Steel Car & Foundry Company.

The American Refrigerator Transit Co. will soon be in the market for 1,000 refrigerator cars. The specifications have not been completed.

F. M. Hicks, of the Hicks Locomotive & Car Works, has sold the following equipment: Chicago, Peoria & St. Louis, six first class passenger coaches; Chas. H. Gates, Toledo, Ohio, one dining car; Northwestern R. R. Co. of South Carolina, one combination car and one passenger coach.

The Southern, as reported in our issue of Dec. 4, has ordered six postal cars from the American Car & Foundry Co. These cars will be 60 ft. long, 9 ft. 10⅛ in. wide over sides, and 14 ft. 7½ in. high over all, with wooden frames and underframes. Special equipment includes Westinghouse brakes, Diamond special brake-beams, Janney-Buhoup couplers, Railway Steel-Spring Co.'s springs, Harrison dust guards, McCord journal boxes and journal box lids, Pintsch gas, Baker heater, standard steel platforms, six-wheel trucks, Buhoup short vestibules and McKee-Fuller Co.'s wheels.

BRIDGE BUILDING.

ALLENTOWN, PA.—Richard Loper has made a contract with Doyle & Doak to build a bridge connecting Allentown with Salisbury, for the Allentown and South Allentown Bridge Company, which was formed in 1901 for this purpose. It will be 1,904 ft. long and 120 ft. high at its highest point, crossing a deep ravine. More than $75,000 has been spent for rights of way and abutments. It is to be a toll bridge.

BLOOMSBURG, PA.—A number of bridges may be built along the line of the Columbia & Montour Electric Ry. and over Fishing Creek.

CARLISLE, IND.—A new bridge of iron may be built in the spring over Bussroe creek by the town.

DAVENPORT, WASH.—Bids are wanted Jan. 5, by A. S. Brown, County Auditor, for building a highway bridge of two spans each 100 ft. long with approaches of 49 ft. and 71 ft. over Spokane River near Reardan.

DRESDEN, OHIO.—The decision of Judge Thompson, in the United States Circuit Court, upholds the Cincinnati & Muskingum Valley in its replacing the present superstructure of a bridge near this place with a steel bridge.

ELIZABETHTOWN, OHIO.—Reports say that the County Commissioners have made an appropriation for building a bridge over the Great Miami River to cost about $58,000 for substructure and $120,000 for superstructure.

EDELMAN, PA.—Bids will be asked by the County Engineer for building a steel bridge 40 ft. long to replace the present structure over Bushkill Creek.

FORT WRIGHT, WASH.—A bill has been introduced in the Lower House of Congress appropriating $100,000 to build a bridge over the Spokane River at Fort Wright.

FREDERICTON, N. B.—C. H. LeBilois, Commissioner of Public Works, is receiving bids for the rebuilding of bridges in Madawaska and Victoria Counties.

The New Brunswick Government is negotiating with the Quebec Government for the building of a steel passenger bridge at Metapedia.

HARRISBURG, PA.—Bids will shortly be asked for the building of a State bridge at Stroudsburg. Herman Loeb, of Pittsburg, has been directed to prepare plans for the Wayne County bridge near Honesdale.

HOLYOKE, MASS.—Plans for the building of a new railroad bridge over Main street, it is reported, have been received by the Board of Public Works from the New York, New Haven & Hartford, the estimated cost of which will be about $12,000.

MACON, GA.—The Council, at a recent meeting, decided to instruct the city attorney to prepare an ordinance requiring the Central Railway Co. to build a steel bridge over the Walnut street crossing.

MARINETTE, WIS.—The Bird & Wells Lumber Co., of Wausaukee, are reported to be in the market for a 50-ft. steel span bridge for the Peshtigo River. Address Harry A. McCallum & Co., Engineers, Marinette, Wis.

MINDEN, NEB.—Bids per lineal foot are wanted Jan. 13 by Chas. Swanson, County Clerk, for all bridges to be built for one year commencing Jan. 13, 1904, in Kearney County.

MINNEAPOLIS, MINN.—Plans for the two viaducts to be built by the Great Northern and Minneapolis & St. Louis Railroads, call for a steel structure 168 ft. long, two roadways each 21 ft. wide, with sidewalks of 12 ft., three plate girders, two abutments, six steel posts for intermediate supports, and a steel and concrete floor system for the Western avenue bridge, and for a steel structure 117 ft. long, with a roadway 32 ft. wide and sidewalks of 9 ft., two plate girders, two abutments, four steel posts for intermediate supports, and a steel and concrete floor system for the Holden street bridge. The courts will decide whether the city shall share the expense of building these viaducts. Address the City Engineer.

NEW YORK, N. Y.—Bids are wanted Dec. 21, by the Department of Bridges, for furnishing the labor, materials and plant necessary for building the elevator towers, etc., in the Boroughs of Manhattan and Queens, of the Blackwell's Island Bridge (No. 4) over the East River, between the Boroughs of Manhattan and Queens. The work as advertised in the *Railroad Gazette* consists of building four masonry towers on the east and west anchor piers, four masonry towers and two power houses, with the necessary foundations for the same, on Blackwell's Island, and attics on the Manhattan and Queens piers. The amount of security required is $150,000. The time allowed for the completion of the work will be 300 working days. Gustav Lindenthal is Commissioner of Bridges.

An agreement, it is said, has been reached by the city and the New York Central for building the overhead crossing at Fordham Heights, and a drawbridge at Kingsbridge.

PORTLAND, ORE.—It is reported that plans are ready for building a steel bridge 400 ft. long over Balch creek to Willamette Heights. W. C. Elliott is City Engineer.

POTTSVILLE, PA.—A conference has been held between the city officials and the Pennsylvania Schuylkill Valley R. R., to arrange for the building of a bridge over the tracks to cost about $200,000.

PUEBLO, COLO.—The Council, it is reported, has passed an ordinance appropriating $120,000 for the following bridges: Viaduct over the Denver & Rio Grande tracks at South Main street, $75,000; bridge at Eighth street, $25,000; bridge at Fourth street, $20,000. E. W. Hathaway is City Engineer.

ROCHESTER, N. Y.—The Common Council has authorized the making of plans for improvements along Densmore creek to cost about $25,000, including the building of about 366 ft. of masonry and several bridges.

SAGINAW, MICH.—Bids are wanted Dec. 31 by W. H. Bartow, Clerk of the Board of Public Works, for rebuilding the Genesee avenue bridge also for building a new bridge at Center street over the Saginaw River.

SAN BERNARDINO, CAL.—The County Supervisors have ordered the asking of bids for a steel bridge 242 ft. long to be built over the Santa Ana River on E street to replace the present structure; also for a steel bridge 80 ft. long to be built over Chino creek.

SAYBROOK, CONN.—It is reported that the drawbridge of the New York, New Haven & Hartford over the Connecticut River will be replaced with a double track structure, and that the masonry will be designed for a four-track structure. Three other new bridges are to be built on the Shore Line Division.

SCHUYLERVILLE, N. Y.—The Northumberland bridge, which was destroyed by fire last September, may soon be rebuilt. F. B. Peck, of Waterford, may have charge of this work.

SIMCOE, ONT.—D. Dalton, Reeve, is receiving bids for the construction of a steel bridge to be built over Big Creek at Delhi.

SPOKANE, WASH.—The bids opened Dec. 3 for building the high Hangman creek bridge were: A. L. Snow & Co., $45,917; Joe Zingobel, $49,720; August Ilse, $52,466; Porter Brothers, $52,900; H. J. Skinner & Co., $54,725; J. A. Clarke, $55,500; Peter Costello, $57,700; Puget Sound Bridging & Dredging Co., $59,685.55, and Burwell Construction Company of Seattle, $79,843. A. F. Gill is City Engineer. (Nov. 20, p. 837.)

STREATOR, ILL.—Plans, it is reported, are ready for building the steel bridge to cost about $50,000, at Main street. F. T. Rolf is City Engineer. (Aug. 21, p. 609.)

TRENTON, N. J.—Wilbur F. Sadler has bought the stock of the Yardley Bridge Co., which represents the franchise, five piers and two abutments for a bridge to be built over the Delaware River. Plans have been made to finish the work by putting up a steel bridge of five spans each 162 ft. long and one 98 ft. long by 20 ft. wide, at a cost of about $50,000.

WARREN, PA.—The Council is expected to authorize an election to determine whether the city shall issue bonds to the amount of $30,000 for building two new bridges over Conewago Creek, to be located at Pennsylvania avenue, and at the foot of Third street.

Other Structures.

BARNSDALL, PA.—The West Side Belt R. R. will build an eight-stall roundhouse, also a car shop of one story 100 ft. x 200 ft., of brick and steel construction, for which bids will be asked about April 1 by H. T. Douglas, Jr., Chief Engineer, at Pittsburg, Pa.

BLOOMINGTON, ILL.—The Cleveland, Cincinnati, Chicago & St. Louis and the Lake Erie & Western will build a brick passenger station of one story, to cost about $20,000. Bids have not yet been asked for.

CLEVELAND, OHIO.—The McBeth Iron Works is rebuilding its foundry recently damaged by fire. New equipment, including large traveling crane, will be put in, which will double its former capacity and enable the handling of castings up to 50,000 lbs.

COLUMBIA, S. C.—The Seaboard Air Line, it is reported, will shortly start work on a new passenger station at Gervais and Lincoln streets.

EAST PITTSBURG, PA.—The Westinghouse Machine Company, it is announced, is getting ready to build shops in which to make the Parsons turbine.

GUTHRIE, OKLA. T.—The Fort Smith & Western, it is reported, is to build a new roundhouse on which work will shortly be commenced.

KANSAS CITY, MO.—Bids are wanted Dec. 31, by the Board of Public Works, for building a tunnel under the Kaw River. Robert E. King is Secretary.

LIVINGSTON, MONT.—It is reported that improvements to the Northern Pacific shops at this place will include a new machine shop, car shops, boiler shop, blacksmith shop, store house and power house to cost about $800,000. The plans, it is stated, are at St. Paul awaiting approval.

LOUISVILLE, KY.—The Chicago, Indianapolis & Louisville will build a two-story brick freight house as soon as the ordinance granting permission to close Pirtle street is granted.

NEW ORLEANS, LA.—Bids are wanted Jan. 5, by the Board of Commissioners, for building the Girod street steel shed. Hugh McCloskey is President.

NEW YORK, N. Y.—Bids will be received by H. Fernstrom, Chief Engineer, New York Central & Hudson River Railroad, Grand Central Station, New York, Dec. 21, for the material, delivery and erection complete in place of the structural steel work for a bridge to carry 233rd street, Woodlawn, New York City, over the tracks of the railroad, together with the frame supporting the floor of the proposed station, and the structural steel and cast iron work for the station canopies, stairways, baggage lifts and heater house.

Separate bids will be received by H. Fernstrom, Chief Engineer, New York Central & Hudson River Railroad, Grand Central Station, New York, Dec. 21, 1903, for the masonry and for the building and completion of an overhead passenger station 30 ft. 10 in. wide x 75 ft. 10 in. long, with baggage lifts and stairs, coal, heater and motor rooms, canopies, and fences enclosing platforms, and fences between tracks, at Woodlawn, New York City, on the Harlem Division of the N. Y. C. & H. R. R. R.

The Delaware, Lackawanna & Western is asking bids for the building of a ferry house at the foot of West 23rd street, Manhattan. (Nov. 27, p. 858.)

The Central of New Jersey, it is reported, will build a two-story ferry house at the foot of West 22d street.

PRATT CITY, ALA.—It is reported that ground has been broken for the Southern car shops to be located between Thomas and North Birmingham.

ROSEVILLE, N. J.—Bids are wanted Jan. 15, by L. Bush, Chief Engineer of the Delaware, Lackawanna & Western at Hoboken, N. J., for a passenger station at Seventh avenue and North Ninth street. It is to be a brick and stone structure of two stories, 30 ft. x 102 ft., to cost about $22,000.

ST. LOUIS, MO.—Plans are being prepared for a 15-stall roundhouse to cost $30,000 and a machine shop to cost $8,000, for the St. Louis, Kansas City & Colorado Railroad, to be built at St. Louis.

SCHENECTADY, N. Y.—The Schenectady Railway Co. will build a brick and steel repair shop for cars. The structure is to be one story, 200 ft. x 200 ft., to cost about $40,000. C. C. Lewis, Chief Engineer, will receive bids.

SCRANTON, PA.—Bids are being asked by the Williams

Drop Forging Co. for building its shops on ground 90 ft. by 180 ft. The company expects to have its works in operation early in the spring. W. J. Lewis is Secretary.

SUMMIT, N. J.—Bids are wanted Jan. 15, by L. Bush, Chief Engineer, Delaware, Lackawanna & Western, at Hoboken, N. J., for building a passenger station at Maple avenue. It is to be of brick and stone construction, of two stories, 40 ft. x 90 ft.; also a one-story shelter house on the opposite side of the tracks, connected with the main building by a bridge over the tracks, to cost about $40,000.

TOPEKA, KAN.—The Atchison, Topeka & Santa Fe is building a freight house of one story 42 ft. x 421 ft., and an office building of two stories, 52 ft. x 70 ft., of brick, to cost about $45,000, for which bids are being asked Dec. 21 by C. A. Morse, Acting Chief Engineer.

VINCENNES, IND.—The Central Car & Foundry Company, it is reported, will build its works here. The buildings will cost about $85,000, and the machinery about $125,000 additional.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALBUQUERQUE EASTERN.—It is reported that work will be resumed at the beginning of the year on this railroad from Moriarty to Albuquerque, N. Mex., 46 miles. About 16 miles of this line had been graded when work was stopped last summer. Connection will be made with the Santa Fe Central at Moriarty.

ATCHISON, TOPEKA & SANTA FE.—The newspapers say that this company will build a branch from Eagle Lake, Texas, south to a point near the mouth of the Colorado River on Matagorda Bay. The Cane Belt R. R., which was recently acquired by this company, runs south from Eagle Lake for a distance of 50 miles, and it is probable that the report refers to an extension of this road the remaining 20 miles to the Gulf.

BLACK HILLS & WYOMING.—An officer writes that contracts will shortly be let for building this line from Rapid City, S. Dak., to Mystic, 35 miles. The company recently bought the Dakota, Wyoming & Missouri River, which had completed eight miles of railroad between these points. C. D. Crouch, Akron, Ohio, is President, and F. C. Tucker, Deadwood, S. Dak., is Chief Engineer. (Nov. 27, p. 858.)

CARTHAGE & WESTERN (MISSOURI PACIFIC).—According to press reports, this company will open its line on Dec. 21, from a point 1½ miles north of Carthage, Mo., to Asbury, 18 miles. The road will pass through Alba, Neck City, Cliffwood and Georgia City. (See Construction Supplement.)

CENTRAL TRACTION.—Articles of incorporation have been filed by this company in Illinois. It is proposed to build an electric railroad from Decatur west to Springfield, Ill., 40 miles. The line will parallel the Wabash between these points. The incorporators and first Board of Directors are: W. B. McKinley, Charles Zilly, B. R. Stephens, F. H. Hahn and H. J. Pepper, all of Champaign, Ill.

CENTRAL OF GEORGIA.—An extension of this road from Sellersville, Ala., to Florala, 23 miles, has been opened for traffic.

CHICAGO & NORTH WESTERN.—An officer writes that work is now in progress on a branch line from Girard, Ill., south to coal fields near Gillespie, 24 miles. Grading is practically completed and track laying will be begun about Jan. 1. Winston Bros., of Minneapolis, are the contractors.

CLEVELAND, CHADRON & MEADVILLE.—This company has been incorporated to build a railroad from Cleveland, Ohio, northeast to Meadville, Pa., 80 miles. W. C. Warner, H. A. Stahl, A. R. Warner and others are incorporators. The headquarters of the company are at Cleveland.

EASTERN MAINE (ELECTRIC).—Articles of incorporation have been filed by this company to build an electric railroad from Bangor, Me., through Hermon, Levant, Carmel, Corinth and Garland to Dexter, 35 miles. C. W. Mullen, F. J. Martin, E. B. Weeks and others, of Oldtown, Me., are incorporators.

EL PASO & SOUTHWESTERN.—It is reported that the branch line from Naco, Ariz., to Lewis Springs, 22 miles, is practically completed, and that it will be opened for traffic by the end of the year. Orman & Crook are the contractors.

ERIE.—The report is revived that this company will build a line from Galion, Ohio, northeast to Cleveland, 70 miles, paralleling the Cleveland, Cincinnati, Chicago & St. Louis between these points.

EUFAULA & ABBEYVILLE (ELECTRIC).—This company has been incorporated in Georgia to build an electric railroad from Abbeyville, Ga., west to Eufaula, Ala., 90 miles. B. B. McKenzie, R. A. Barlow, C. A. Martin and others, of Abbeyville, are said to be interested.

FAIR HAVEN & WESTVILLE (ELECTRIC).—The extension of this road from New Haven, Conn., to Derby, nine miles, has been completed and the line was opened for traffic on Dec. 12.

GULF & SHIP ISLAND.—An officer writes that eight miles of track have been laid on the extension from Mendenhall, Miss., to Silver Creek, 29 miles. Grading is in progress on the remaining 21 miles. Location surveys have been completed for an extension between Silver Creek and Columbia, 27 miles. W. W. Vail, Gulfport, Miss., is Chief Engineer. (Nov. 20, p. 838.)

HOUSTON, BEAUMONT & NORTHERN (ST. LOUIS & SAN FRANCISCO).—The charter of this Texas company has been approved by the Secretary of State and it is said that work will shortly be begun. The road is projected from Houston to a point on the Sabine River, 15 miles southeast of Newton, Texas, a total distance of about 140 miles. Several branches and connecting links are proposed to connect it with the logging roads in that vicinity. The company is reported to be a St. Louis & San Francisco project. Among the incorporators are W. H. Lyford, Chicago; C. W. Hillard, New York; W. C. Preston, Fort Worth, and B. F. Berger, S. A. McNeely and F. M. Aldrich, of Houston, Texas.

ILLINOIS CENTRAL.—Press reports state that this company has secured right of way over the C., M. & St. P. tracks from West Madison to Watertown junction, and will run trains through Madison, connecting Sun Prairie, Columbus, Beaver Dam, Fond du Lac, Oshkosh and Green Bay on the north with the system south by an agreement with the Northwestern Road. Construction of the Green Bay line will be begun early next spring. The line has been surveyed and will be known as the Madison & Northwestern.

INDIAN RUN.—Incorporation has been granted this company in Ohio, to build a railroad from Logan northeast to McConnellsville, 30 miles. H. B. Camp, B. P. Wise, L. W. Camp and H. E. Andress, of Akron, Ohio, are incorporators.

JACKSON & KANSAS CITY.—Articles of incorporation have been filed by this company in Tennessee. It is proposed to build a railroad from Jackson, Tenn, northwest to the Missouri State line and eventually to Kansas City, Mo. S. H. Wallace, J. E. Pope and others are incorporators.

LOUISVILLE & NASHVILLE.—This company has completed an extension of the Cumberland Valley Division from Stony Fork Junction, Tenn., south to Logmont, six miles. This line connects with the branch to Owens Switch at Stony Fork Junction.

MEXICAN CENTRAL.—The preliminary survey for a branch line from Gallegos, Mexico, to Cananea, 120 miles, has been completed. It is stated that contracts for grading will be let in the spring.

MEXICAN ROADS.—The Mexican Government has granted a concession to a syndicate of Mexican capitalists to build and operate a railroad from Salamanca, in the State of Guanajuato, northeast to San Juan de Vega, 30 miles. Connection will be made with the Mexican Central at Salamanca, and with the National of Mexico at San Juan de Vega. Surveys are reported in progress.

MISSOURI PACIFIC.—Press reports state that this company is planning to build an extension of its Topeka-Fort Scott line from Topeka, Kan., northwest to Frankfort, 68 miles, connecting at the latter point with the Central branch. It is also stated that the company will build from McPherson northwest to Marquette, 16 miles. Surveys are reported in progress on both proposed lines.

MORNING STAR.—The State Railroad Commission of Arkansas has granted this company an extension of its charter for six months. The proposed route of the road is from Yellville, Ark., southeast to Newport, 80 miles. It is reported that location surveys have been completed. B. W. Chase, S. G. Wilson, N. J. Bearden and C. Williams, of Rush, Ark., are said to be interested. (Sept. 11, p. 660.)

NEW ORLEANS TERMINAL.—Grading has been begun on this belt line at New Orleans. The company was organized in the interests of the St. Louis & San Francisco R. R. and the Southern Ry., and it will build a belt line around the city. L. S. Berg is President.

NEW YORK, ONTARIO & WESTERN.—An officer writes that during the present year 37½ miles of second track have been completed, of the total distance of 107 miles between Cadosia and Cornwall. It is stated that during the coming year about 40 more miles will be completed.

NORTH & SOUTH ARKANSAS.—A charter has been granted this company in Arkansas to build a railroad from Ravenden, Lawrence County, north to a point near Elm Store, Randolph County, 20 miles. Connection will be made with the St. Louis & San Francisco at Ravenden. R. D. Welch, Ravenden Springs; M. H. Long, Imboden, and others are incorporators.

OGDEN & NORTHWESTERN.—It is reported that this company will begin work in the spring on an extension of its line from Hot Springs, Utah, north to Brigham, 15 miles. It is stated that the line may eventually be extended into the Coos Bay country and thence to the Pacific coast.

OZARK & CHEROKEE CENTRAL.—Surveys have been completed and rights of way are practically all secured for a branch line from Okmulgee, Ind. T., southwest to Shawnee, Okla. T., 75 miles. C. D. Purdon, St. Louis, Mo., is Chief Engineer.

PEARL & LEAF RIVER.—This company has filed an application with the Railroad Commission for permission to change its name to the Mississippi Central. The road runs from Hattiesburg, Miss., to Silver Creek, 58 miles. Work is in progress beyond Silver Creek.

ST. LOUIS, KANSAS CITY & COLORADO.—This road has been finished from Gasconade, Mo., west to Versailles, 63 miles. Work is now in progress on an extension from Versailles to Kansas City, 117 miles.

SOUTHERN PACIFIC.—Contract for grading the new yards at Montello, Nev., has been let to Corey Bros. & Co., of Ogden, Utah. Montello will be the terminus of a freight division as soon as trains begin to use the new Ogden-Lucin cut-off. The yards will contain six miles of track, with a station, engine house, steel water tank and 16,000-ton coal bins. Work will be begun at once.

Rights of way are secured for an extension of the Imperial branch of the Southern Pacific from Imperial, Cal., to Calexico, near the boundary line between the United States and Mexico. It is stated that work will be started soon after the beginning of the new year.

STANLEY, MERRILL & PHILLIPS.—This road has been opened for traffic between Stanley, Wis., and Hannibal, 24 miles with a branch from Bellinger to Diamond Lake, seven miles.

TUSCALOOSA BELT.—Rights of way have been secured for an extension from Tuscaloosa, Ala., to Holton, five miles. Contracts for building will shortly be let. F. W. Monnish, Tuscaloosa, is General Superintendent.

VALLEJO, BENICIA & NAPA VALLEY (ELECTRIC).—Contract has been awarded to Erickson & Peterson for building this railroad from Vallejo, Cal., north to Napa City, 15 miles. It will parallel the Southern Pacific between these points. The contract calls for the completion of the work within 90 days. (Oct. 9, p. 730.)

VINITA, PAWHUSKA & WESTERN.—The proposed route of this new railroad is from Vinita, Ind. T., northwest to Bartlesville, 50 miles, with a probable extension west to Pawhuska and Bliss, Okla. T. According to press reports, grading will be begun within 60 days.

WATERLOO & CEDAR FALLS RAPID TRANSIT.—This company has opened its extensions from Denver, Iowa, to Sumner, 15 miles, and from Denver to Waverly, eight miles. It has also acquired possession of the tracks abandoned by the Chicago Great Western between Waverly and Sumner. The company now has a continuous line 44 miles long between Waterloo and Sumner. Electricity is used between Waterloo and Denver, but steam will be used on the new line from Denver to Sumner.

WICHITA, OKLAHOMA & INDIAN TERRITORY.—This company has been incorporated in Oklahoma, with an authorized capital of $6,000,000. It is proposed to build a railroad from Wichita, Kan., through Oklahoma and Indian Territory to Fort Smith, Ark., 300 miles. J. P. Woolsey, Perry, Okla. T.; J. E. Slater, Stillwater, Texas, and others are incorporators.

ZANESVILLE, MARIETTA & PARKERSBURG.—This company has filed a certificate with the Secretary of State in Ohio for building a branch line from Darlington, Muskingum County, to the mines of the Northern Coal Company in the same county.

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ATLANTIC & BIRMINGHAM.—The consolidation of this company with the Tifton, Thomasville & Gulf and the Tifton & Northeastern has been completed. The capitalization of the consolidated company will be for each mile of main line of the respective companies consolidating as follows: $15,000 of common stock, $6,000 of preferred stock and $12,000 of 5 per cent. 30-year first mortgage gold bonds. *The Commercial & Financial Chronicle* says "the right is vested in the new board of directors to increase the bond issue at the rate of $12,000 per mile for additional miles of road to be hereafter acquired or constructed. The outstanding securities are to be retired with the new issue. The new bonds are 30-year 5 per cent. gold bonds of $1,000 denomination, and are issuable as follows: Amount authorized, $2,640,000; amount issued, $2,200,000; remainder in treasury to be used for paying for new equipment recently ordered, $440,000; issuable for additional road constructed or acquired, $12,000 per mile."

BRADFORD, BORDELL & KINZUA.—It is stated that negotiations have been completed for the taking over of this road by the Buffalo & Susquehanna. The road was sold under foreclosure proceedings on December 1, and it now appears that the purchasers were associated with the Buffalo & Susquehanna. The road is 41 miles long and runs from Bradford, Pa., to Kane.

CENTRAL VERMONT.—The report of this company for the fiscal year ending June 30 shows gross earnings of $3,636,381, an increase of $229,950. Operating expenses were $2,874,391, an increase of $232,070. Of this amount, however, $153,436 was for cost of improvements and additions to rolling stock, and was charged directly to operating expenses. Adding this amount to the surplus for the year, makes approximately 5 per cent. carried on the outstanding $3,000,000 stock.

COAL & COKE.—This company has filed a mortgage for $10,000,000 with the Trust Company of West Virginia at Elkins, as trustee. The proceeds of the bonds sold will be used for the line which this company is building between Charleston, W. Va., and Elkins, 175 miles.

HUDSON & MANHATTAN.—A franchise was granted this company by the Board of Aldermen of New York City on Dec. 15. The company proposes to build a tunnel under the North River from Jersey City to Cortlandt street, Manhattan. W. G. McAdoo is President.

ILLINOIS CENTRAL.—Harvey Fisk & Sons are offering at 98½ and interest, $500,000 main line extended first mortgage 3½ per cent. bonds. The mortgage covers a total mileage of 706 miles of main line, including terminal property in Chicago.

NEWTON & NORTHWESTERN.—This company has filed a mortgage with the Adams Trust Company, a Massachusetts corporation, for $300,000, covering the entire line of the road, its rights of way, franchises, and all property owned by the company. The mortgage is given to secure $300,000 funding mortgage bonds, running for 10 years, subject to call, and bearing interest at the rate of 5 per cent.

NORTHERN SECURITIES COMPANY.—The arguments in the appeal of the Northern Securities Company, the holding company of the Northern Pacific, and the Great Northern railroad companies, from the decision of the Circuit Court of Appeals, was begun before the Supreme Court of the United States on Dec. 14. The decision of the Circuit Court of Appeals held that the merger of the railroads under the Securities Company as a holding company was a restraint upon interstate commerce and in direct violation of the Sherman Anti-trust Act.

PENNSYLVANIA.—Bids for building this company's tunnels under the North River from New Jersey to Manhattan, and under the East River to Long Island, were opened by the company on Dec. 15. A large number of bids were received, and President A. J. Cassatt says: "A number of bids have been received for the Pennsylvania Railroad Co.'s New York tunnel work based on the plans and specifications and also on other methods submitted by the contractors. The relative value of these bids can only be determined after they have been classified, but a cursory examination shows them to be within the company's estimate."

PINE BLUFF & WESTERN.—This company has been released from its mortgage of $1,200,000 with the Illinois Trust Company, and has executed a mortgage for a similar amount with the American Central Trust Company. The mortgage covers all the properties, franchises and rolling stock of the road.

ST. LOUIS & SAN FRANCISCO.—This company has arranged to make an issue of 4½ per cent. gold notes, limited to the amount of $9,160,000. Of this sum, $7,125,000 is now issuable against the deposit of the collateral trust 4's, covering the New Orleans extension and the preferred stock of the St. Louis, San Francisco & New Orleans R. R. Co. The remaining $2,035,000 can be issued only against the deposit of additional New Orleans extension bonds.

SOUTHERN PACIFIC.—The Southern Pacific has engaged an electrical engineer in the person of Mr. A. H. Babcock, of Oakland, Cal. For the past two years Mr. Babcock has been connected with the North Shore Railroad, on its electric line, and his engagement by the Southern Pacific is understood in San Francisco to confirm the reports that the Southern Pacific is considering definite plans for the introduction of electric motive power on one or more of its suburban lines on the east side of San Francisco Bay.

TERMINAL R. R. ASSOCIATION OF ST. LOUIS.—This company has borrowed $4,500,000 from the First National Bank of New York. The terms of the loan have not been made public but it is stated that it is for a short period only. The money will be used to complete the improvements now making for the Exposition of 1904.

UNADILLA VALLEY.—The foreclosure sale of this company is advertised for Jan. 4, 1904, at Utica, N. Y. The company operates a line from Bridgewater, N. Y., to New Berlin, 19 miles. Extensions from New Berlin to Oneonta, 32 miles, and from Bridgewater to Utica, 18 miles, were authorized, but the surveys were not completed.